ENCE AND INDUSTRY

June 1953

25¢

Organic Gardening

Better Gardening without Chemicals

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Roto-Hoe, Complete	$134.00
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2 H.P. Roto-Hoe only $134.00

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GOOD HEALTH REQUIRES RELAXATION

In the rush of modern living more and more people are learning that their doctors are right—it is important to one's health to have active physical participation in some good hobby. And plenty of folks feel that gardening is one of the best hobbies—but it can be hard work without the use of proper tools. So let ROTO-HOE do the hard work for you—you get the healthful relaxation without the tiresome difficult work.

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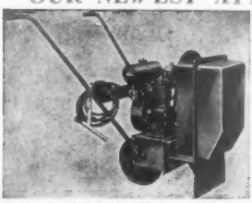

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Now we offer for the first time the new Roto-Zephyr Sprayer—for spraying trees and plants around home and garden. The Bonderized and enameled 5-gallon tank attaches to the standard ROTO-HOE power unit in minutes; you can easily wheel sprayer wherever wanted. Piston type bronze pump has screen and relief valve, operates from ROTO-HOE's powerful Lauson motor. Spray gun is modern in design, light weight and foolproof. This complete ROTO-ZEPHYR Sprayer attachment costs only $77. to add to basic unit —or may be purchased separately. See your ROTO-HOE dealer.

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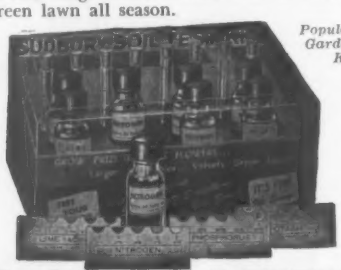

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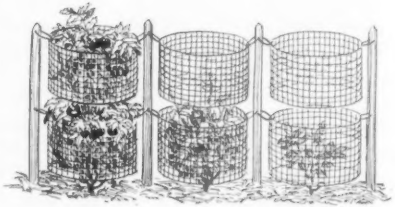
the FORUM

tomato supports

This is an account of some of my experiments in tomato raising. The sketch below indicates how short cylinders of wire cloth are hung within which the tomato plants are grown.

The cylinders are some 15 inches in diameter, and the posts just clear them. The lower ones are hung when planting. When the vines need support higher up, additional cylinders are added.



Almost all of the tomatoes are thus kept up off the ground. Contact with the ground scars or ruins a great many tomatoes. As a result of employing these wire cloth cylinders, the plants flourish and fruit ripens earlier. With

---

THE COVER

"Guardians of the Garden" is a vibrant memorandum of the valuable service rendered by birds in keeping both our soils and plants free from countless insect pests. Indeed, the diligent, yeomen work of the birds, from nestling to veteran warbler, in performing this and many other beneficial tasks is too often overlooked. A tip of the wing to Cynthia Koehler, designer of several prior Organic Gardening **covers, for this pleasing and timely reminder.**

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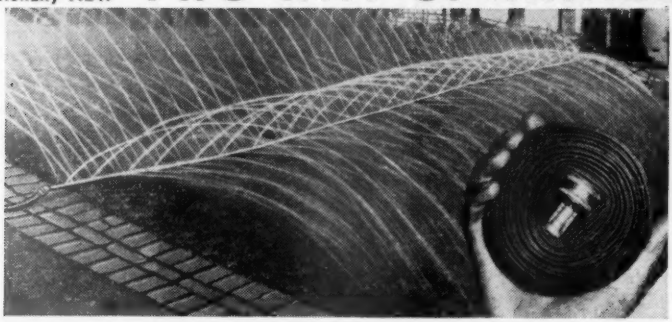

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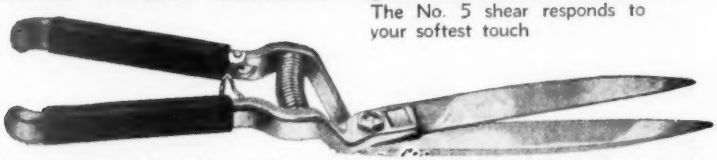

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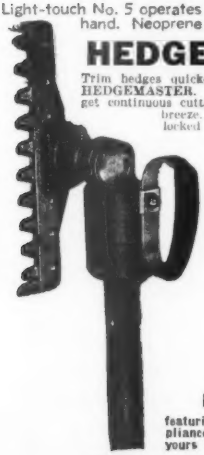

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proper attention to the soil—I spade weeds and cuttings under—the tomatoes have more flavor. I gathered ripe tomatoes at the end of July last year. I gather tomatoes just before their ripe coloring can attract birds, roll them in paper, and store them in a cool place. A couple of days in the house finishes the ripening.

Myron Francis Hill
Westport, Conn.

apple maggot fly bait

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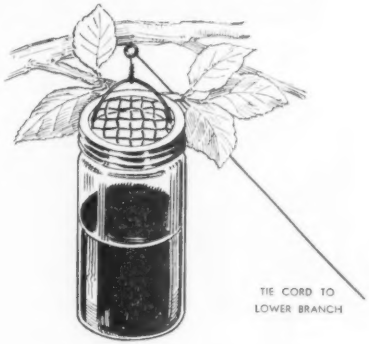
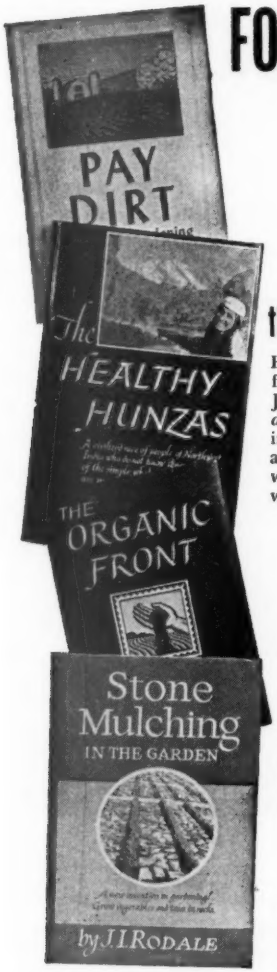
1. Black strap molasses (1 part)
   Water (9 parts)
   Yeast (1 cake per gallon)
2. Diamalt (1 part)
   Water (9 parts)
   Yeast (1 cake per gallon)

Proceed as follows: For a battery of ten traps take one quart of molasses or Diamalt to nine quarts of water. Dissolve the yeast in water, add the syrup and stir well. Set aside for forty-eight hours, or until fermentation is complete. Then fill wide-mouth quart



jars about three-quarters full and cover the top of jar with a plate of one-quarter inch mesh hardware cloth in place of regular canning plate. Attach a wire handle to the screen.



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Secure a pulley or ring or screw-eye to a branch of the tree and run a stout cord through it in such a way that it will clear the branches when raising or lowering. This device caught hundreds of flies in one jar.

Mrs. E. Kocher
Harrisville, Michigan

soil analysis points way to intelligent, economical fertilizing

The article "Soil Management for Home Gardeners" (*Organic Gardening*, March, 1953) seemed to hit the spot for me and a lot of my friends. I am enclosing pictures of sunflowers and potatoes grown organically.

My garden grew like a jungle. Phosphate and potash rock plus compost and straw mulching really produced

a tremendous crop. I have never before harvested so many vegetables that were so good to eat. I planted 80 pounds of potato seed, harvested 1,070 pounds.

The sunflowers were almost fifteen feet high. Notice size of leaves, dark green and shiny. Carrots were as long as a quart milk bottle and were crisp and tender. All the people who tasted my vegetables remarked about the sweet rich flavor.

Michael Maglic
Barberton, Ohio

a new discovery of the effect of compost

In the periodical *Uebersicht* (Survey) of June 22nd, 1952, is the following interesting review: "Acid Plant Growth on Sour Soils."

Under this headline the "Umschau in Wissenschaft Und Technik" No. 4 reports about experiments with divergent acid-opposing species of certain plants to grow on acid soil had, until now, been explained by stating that these plants could not endure the high degree of acidity. The experiments cited in *Nature* (1951) showed, however, that growth of such soils was entirely normal when compost was added to that soil, in spite of the fact that the pH of the soil had only been slightly changed by this compost. The result of these experiments lead to the conclusion that the impeding factor for plant growth within acid soil cannot be the pH, but that there must be still other—up 'til now unknown factors."

On a biological-dynamic farm in Westfalen an excellent yellow clover grew on a soil that had a pH of 5.04. A well-known professor of soil science, when inspecting the farm, remarked dryly "Here, this clover shouldn't grow at all! These results get us again one step forward in the realization of how important it is to bring life into our soil by organic fertilizing."

Translated by Dr. August von Borosini

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WITH THE EDITOR

are we using too much compost?

Part IV

J. I. RODALE

Up to this point we have considered some data on the question as to whether there is danger in using too much compost or organic matter in the garden. A discussion of this point was bound to come at some time. Why not now? Why not give a thought to the possibility that there is a point beyond which it is not necessary nor desirable to apply more humus-producing material. It is a neglected subject as far as research is concerned. In this chapter we will discuss the effect of too much nitrogen. We remember, of course, that humus gives about five per cent of nitrogen, so that if we apply too much of the former there may result an excess of the latter.

Dr. William A. Albrecht of the University of Missouri has described in his writings how plants may go on a "nitrogen jag." (These are the professor's own words). He shows how the grazing cow is an indicator of the places where there is too much nitrogen, by avoiding grass spots fertilized by recent droppings which cause the grass to grow taller at such spots. The cow, according to Albrecht, is quite a nutritionist, balancing the proteins and carbohydrates in her diet as she moves about the pasture. Whether it is her instinct or merely a difference in taste makes no difference. Something tells the cow that too much nitrogen is not good for her.

Albrecht also refers to experiments with rabbits that were given an opportunity to eat grasses treated with varying amounts of nitrogen. They always avoided grass that was grown with too much nitrogen, leaving it to the very last, and consuming it only to avoid starvation.

excess nitrogen causes unbalance

Charles E. Kellog, in *Soils That Support Us* (Macmillan) says that, "A nitrogen fertilizer may be added to a soil relatively low in one or several of the other plant nutrients, giving rise to such an unbalanced condition that plants grow abnormally with increased susceptibility to disease." In an experiment with orange trees it was found that fruit maturing under low nitrogen conditions had the highest amount of soluble solids (which is very desirable) and a lower acid content. That with the highest nitrogen had the highest acid, which is undesirable. Citric acid etches the enamel of human teeth and is an irritant to the stomach. Medical practice bans citrus fruit to those with

stomach ulcers. In this experiment it was found also that the trees with the highest nitrogen had the lowest vitamin C in their fruit.

Univ. of Arizona Agric. Exp. Station Tech. Bulletin 106. Jan., 1945.

In another piece of research in South Africa it was found that oranges from trees which "have been heavily fertilized with nitrogen have a lower vitamin C content than oranges from similar trees semi-starved of nitrogen." The excess nitrogen also decreased juice content, increased acidity as well as the rind thickness.

Farming in South Africa, December, 1947, article by F. C. Andersen.

Millar and Turk in *Soil Science* (Wiley) say: "A large supply of available nitrogen encourages the production of soft, succulent tissue which is susceptible to mechanical injury and the attack of disease." This reduces crop quality, impairing its keeping and shipping qualities.

Too much nitrogen, by increasing the leafy, vegetative growth sometimes prevents seed from forming in the plant. An excess of nitrogen has been known to reduce the percentage of sugar in beets.

Experiments at Ottawa with apple trees prior to 1936 indicate that physiological disorders which result in early break-down were influenced largely by the amount of nitrogen used. Reporting on these experiments in *Scientific Agriculture* for December, 1940, M.B. Davis and H. Hill wrote that apples grown under varying nitrogen conditions developed internal cork varying from 0 to 100 per cent in proportion to the nitrogen applied. Under low nitrogen conditions the disorder was reduced or eliminated. When nitrogen was fed only until the trees were in full bloom each season, the amount of cork rose to 14 per cent, and when nitrogen application was continued until September 1, the amount of cork was 100 per cent.

disease caused by nitrogen oversupply

I give herewith the results of two experiments showing that an excess of nitrogen caused mildew in plants:

(1) "Potential experiments on effects of time and amount of nitrogen fertilizer on yields and protein formation in two varieties of barley with different water supplies." Plants with larger additions of nitrogen were extensively attacked by mildew. The variety normally lower in protein (protein is 1/6 nitrogen) was more resistant to mildew.

W. Schropp and B. Areng. Bordenkunde Pflanzenernahr. M. 317-43 (1938).

(2) The amount of powdery mildew on wheat is directly proportional to the amount of nitrogen used as a top-dressing in the spring, according to Hebert and Middleton. These findings were made in studies over two years.

North Carolina Annual Report, Agricultural Exp. Station, April, 1948.

I submit herewith additional evidence of the fact that an excess of nitrogen is conducive to the production of disease:

"Verticillium wilt caused greater loss to the Delta planters the past season than ever before and is apparently becoming the most destructive and widespread disease of cotton in the United States. Excessive amounts of nitrogenous fertilizer favor the development of the disease."

Mississippi Farm Research. Vol. 14, No. 2. Fertilizer and Weather Affect Verticillium Wilt, by John T. Presley and James B. Dick.

Another study indicates conclusively that there is a definite correlation between host nutrition and host susceptibility to virus infection and that plants with high nitrogen are most susceptible to mosaic virus.

Effect of nitrogen supply on host. Susceptibility to virus infection. Ernest L. Spencer, Phytopathology, 25:178-191, 1935.

Four varieties of onions grown at high and low nitrogen levels were inoculated with onion-yellow-dwarf virus. Both the percentage expression of symptoms and the percentage actual infection were lower at the lower nitrogen level, both differences being highly significant.

Phytopathology, April, 1946, Vol. 36, No. 4, p. 297-301, Philip Brierley and Neil W. Stuart.

By averaging all the data for the different nitrogen levels it was found that in each of the three experiments plants grown at the low level of nitrogen, irrespective of the phosphorus and the potassium levels, had significantly smaller leaf spots than those at high nitrogen level.

Journal of Agricultural Research, Vol. 76, No. 12. June 15, 1948. p. 305.

In experiments with muskmelon, the observations indicated that high levels of nitrogen result in a significantly greater invasion by fusarium bulbigenum, and a larger number of plants were killed.

Phytopathology, Dec., 1947, Vol. 37, No. 12, p. 875-884.

Studies at the U. S. Dept of Agriculture experimental center at Beltsville, Maryland, indicate that gladioli getting heavy dosages of nitrogen are much more susceptible to leaf spot and bulb rot disease than those not fertilized.

The Maryland Gardener, July, 1950.

There can be no doubt that it is undesirable to have too much nitrogen in a plant, but the question is, does it make a difference whether the nitrogen comes from a chemical fertilizer or from humus? I would not say definitely. There is not sufficient evidence on this point, and until it is proven, I prefer to take a cautious attitude, not going overboard on the amount of nitrogen I give to my plants. A reasonable amount of organic matter means less work and we are also following the natural rule of moderation in everything we do. This will be my policy until it is proven otherwise.

lodging

There is a phenomenon in cropping called *lodging* which occurs especially with respect to the grains. I have had several lessons in the early days of my organic farming experiences, when crops of oats lodged, that is, the plants fell over and their yields greatly reduced the harvest. This was caused by too much nitrogen causing the upper leaf portion to be too heavy for the stem. If there is a potassium deficiency with a nitrogen oversupply, lodging occurs more easily, for potassium is a factor in stiffening the stem of a plant. Lodging will occur definitely from a nitrogen oversupply whether the nitrogen occurs from organic matter or chemical fertilizer. This is why we never apply organic matter when we grow a grain crop, such as oats or wheat. We allow such crops to feed on the residues remaining from previous applications of organic matter in the rotation.

Before closing this chapter I would like to submit an idea which might help us in deciding the question of whether it makes a difference if the excess of nitrogen is from organic sources or from chemical fertilizers. In the human body there is a definite relationship between the calcium and phosphorus in the blood. In an ideal state of health it has been found that the calcium is usually 2½ times the phosphorus. A laboratory with whose work I am familiar finds that in cases of disease this ratio is always distorted. One of the offenders is artificial sugar. When this is eliminated from the diet the calcium and phosphorus always get closer to the correct percentage with spectacular improvement of the patient.

Is it possible that in a plant there are similar ideal relationships existing between one element and another? Should the normal proportion of ni-

trogen be a certain portion of the potassium, for example? We know that nitrogen makes protein, and potassium is a factor in the production of carbohydrate. Should the protein and carbohydrate bear a definite relation or percentage to each other for ideal functioning of the plant? If so, then it doesn't matter where the nitrogen comes from as far as this relationship is concerned. This is a point that will be gone into further in a future chapter of this series.

(To be continued)

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organic oranges

Natural grove care can mean better oranges—and good business, too!

PORTER V. TAYLOR, FLA.

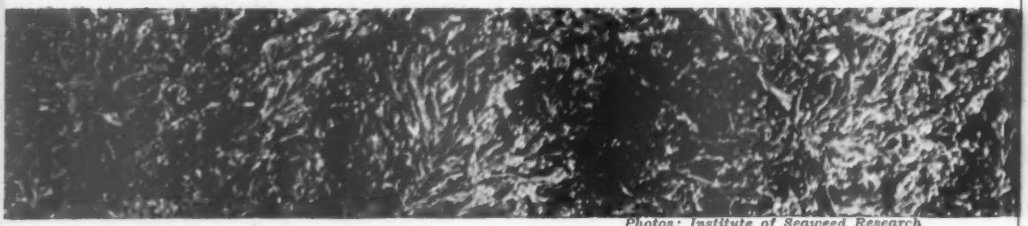
Most Florida citrus fruit growers have increasingly turned to more and more artificiality and turned further away from nature and the wholesome growing of food. In an economic stampede to outrace competition to the consumer-buyer line, the great majority of southern grove owners have unhesitatingly poured tons of chemicals, insecticides, and every other conceivable contrivance of super-synthesized agriculture into their land, into their produce—and, of course, eventually into the public.

What matters if the citrus fruits are unripened, semi- or totally lacking in the sweetness and nutritional values intended by nature as long as the rustle of greenbacks serenades the industry's covetous kingpins?

Well, it does matter to some. One is L. P. DeWolf, owner of the Eagle's Nest Grove near Crescent City, Florida, whose adherence to the belief that nature does not call for synthetic improvement has brought him a flourishing, healthy citrus grove and a justly commensurate flourishing business.

Adhering determinedly—and successfully—to organic methods, DeWolf believes that one cannot continue to harvest good crops year after year without returning vital elements to the land. Natural powdered limestone and crushed granite are used freely along with general organic fertilizing. The rock powders are purchased very reasonably by the ton at Georgia and Florida rock quarries. Freight and drayage bring the total cost to approximately eight dollars a ton—delivered at the groves. This cost permits liberal application of the mineral elements in their natural state at a price far below that of commercial chemical fertilizer. When it is necessary to make an occasional boost in nitrogen, this is done with organic sewage tankage.

Results? Indeed! In every hundred boxes of DeWolf's oranges there are more than two pounds of magnesium and eight pounds of calcium, as well as generous amounts of other minerals. In every box there are six and one half gallons of juice, two gallons superior to the legal minimum of artificially colored, immaturely picked oranges of most of the state's growers. These groves—naturally—boast of insect-free trees, greener leaves, and one of the most hearty, wholesome fruits among the entire citrus belt.



Photos: Institute of Seaweed Research

An analysis of the values and uses of this organically rich material

seaweed as a fertilizer

ERNEST BOOTH, A.M.C.T., F.R.I.C.

Institute of Seaweed Research, Inverness, Midlothian, Scotland

The use of seaweed as a fertilizer dates back many centuries. As long ago as 1681, a Royal decree regulated the conditions under which seaweed could be collected on the coast of France; the kinds that might be collected were specified as was the manner in which they should be used.

Seaweeds are always associated with a rocky formation of the sea bed and most weeds are found in shallow water. The land in such situations is usually a thin cover of sand, or a sandy loam, overlying rock and is exposed to the eroding action of winter gales. The use of seaweed over many generations has resulted in a deep black earth which defies the Atlantic gales.

The seaweeds used as fertilizers belong to two main groups which are distinguished by their habitat. These are the brown weeds which grow between high and low water on rocky situations, and those weeds, also brown, which also grow on a rock bottom below low water mark down to a depth of 60 feet. The first group, often called rockweeds, are relatively small plants, but their growth is usually dense and they are easily collected by pulling or cutting from the rocks; 200 pounds per hour can be gathered easily from a good site. Whilst the number of rockweeds is legion, only two need be mentioned since they are very much more common than any other weeds; these are "knobbed wrack" and "bladder wrack." Both these plants are made conspicuous by the air filled vesicles which enable the plant to reach the surface when the tide comes in; in this way the plants receive more light for photosynthesis.

The sublittoral brown weeds, variously known as Laminaria, oarweeds or tangles, are much larger plants and appear to have a root, a stem and a single large leaf; this similarity with land plants is very superficial and, in fact, these various parts do not function like their counterparts in land plants. Weed beds are often dense and growth is usually about 20-30 tons per acre and may approach 50 tons. All these plants have a frond, or leaf, which is replaced annually, usually about May; a new frond develops and the old growth is detached and cast on the beaches. Unfortunately these fronds soon rot and a decaying heap can be most unpleasant to collect. Stormy weather is usually associated with the fall and winter; during such storms, plants are broken and torn from the sea bed and cast

high and dry by the storm. Thousands of tons may be cast on a beach by a single storm. The complete plant is much more resistant to decomposition and such heaps can be removed without qualms.

These two types are very widespread and flourish over most of the Northern Hemisphere. A third type, the giant kelp, grows off the coast of California. These are brown weeds and both annual and perennial types abound; their chief feature is their length which may exceed 200 feet. They shed their fronds between April and June and decay rapidly if the water temperature exceeds 76 degrees F. Like other brown weeds they are cast by storms and drift weed may also be collected.

Lastly, some mention must be made of the "gulf weed" which gave notoriety to the Sargasso Sea. Although modern evidence refutes the tales of the medieval mariners, Sargassum species do exist, and cast weed is available on the beaches of the Gulf States.

The chemical constitution of seaweeds is markedly different from that of the land plants. In general, land plants owe their rigidity to cellulose whereas seaweeds contain only about 5 per cent cellulose and owe their mechanical strength to alginic acid. The food reserve of land plants is starch, that of marine plants is laminarin, while the place of sugar is taken by mannitol which is rarely found in land plants. Alginic acid, laminarin and fucoidin are found only in seaweeds.

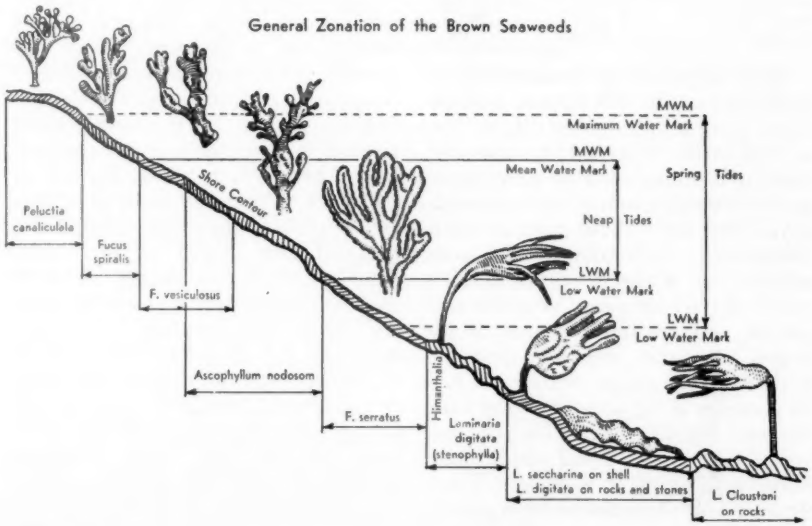
A typical analysis of a commercial sample of rockweed is:—

Moisture	13.5%
Fats	1.4%
Protein	10.5%
Carbohydrates	51.9%
Fibre	6.1%
Minerals	16.6%

The mineral matter contained:—

Silica	1.48%
Copper	0.002%
Manganese	0.016%
Iron	0.01%
Sulphates	4.18%
Chlorine	1.72%
Magnesia	1.01%
Calcium	1.54%
Potassium	2.83%
Iodine	0.17%
Salt	3.65%
Bromine	0.68%
Aluminum	0.22%
Phosphorus	0.18%

The most interesting feature of seaweeds is their ability to concentrate



the mineral matter in the sea, which results in the presence of substantial amounts of a large number of elements in all seaweeds.

Traces of arsenic, boron, cobalt, molybdenum and vanadium are also present. Silver, barium, chromium, lithium, nickel, lead, rubidium, strontium, tin and zinc have also been shown to be present in seaweed. The arsenic content of seaweed (13 parts per million) is less than the normal arsenic content of soil. The chlorophyll content (0.25 per cent) of seaweed is almost as high as that of lucerne and vitamins A, B, E, F, G & K are present in a sample of the giant kelp. Recent work has shown that vitamin B12 is also present in seaweed and this is the first known plant source of this vitamin.

Seaweeds vary widely in composition from month to month and a typical analysis of a brown weed—*Laminaria cloustoni* — illustrate the extremes of this variation:—

	Minimum	*Maximum*
Alginic acid	17.4%	25.3%
Mannitol	5.3%	17.3%
Iodine	0.6%	0.9%
Fucosterol	0.1%	0.1%
Minerals	25.2%	43.7%
Laminarin	nil	14.1%
Cellulose	4.3%	7.9%
Fucoidin	4.8%	7.6%
Protein	9.6%	12.7%

Such variations are common to all seaweeds and, in this respect seaweed varies more than other fertilizers; but as ordinarily obtained in the wet state, it contains slightly more nitrogen than stable manure, twice as much potash but only about half as much phosphates. A citation of the constituents of seaweed reveals a rich source of trace elements, vitamins and potash, and an ample source of nitrogen. A rather special constituent is alginic acid, whose sodium salt has been shown to be active as a soil conditioner. An organic manure containing 25 per cent of a soil conditioner along with mineral nutrients, trace elements and vitamins can be expected

Laminaria cloustoni showing red weeds growing on stipe.

to be a good fertilizer; centuries of usage prove it beyond doubt.

Alginic acid is very susceptible to bacterial attack; this reduces its value as a soil conditioner, but it also means that the microbiological soil flora is correspondingly enriched. This property is undoubtedly the basis of seaweed's activity in a compost heap. When only limited quantities are available, the best use is as a compost accelerator. When chopped it rots readily, and a 200 pound heap will heat to 100 degrees F. in two days—chopping is essential otherwise decomposition is slow. Such a heap should be made to form the core of a compost heap which will be ready for use in six weeks. When only small quantities are available, the weed should be chopped and soaked in hot water (one gallon to two pounds of weed) and the mixture poured over the compost heap after soaking overnight. With dry milled weed a temperature of 140 degrees F. is sufficient, but fresh, chopped weed should be scalded and soaked initially at 160–180 degrees F. Such extracts are good compost accelerators and are in commercial use in this country.

In the garden, potatoes should have first claim on seaweed. The sets should be laid in a trench and surrounded with two pounds of chopped weed (equivalent to four ounces of dry weed); the trench should be filled in and cultivation completed in the usual manner. If sufficient weed is available, a dressing of half this quantity can be applied before ridging. Root crops and brassicas respond well to seaweed and require the ground to be prepared well in advance and dressed with 100 pounds of chopped weed. Celery and peas should be set in prepared trenches to which a similar dressing is applied and raked into the top few inches prior to planting. Salad crops and onions should receive heavy dressings at 200 pounds or more per 100 sq. ft., while seed beds and borders should have only light dressings of 50 pounds per 100 sq. ft., which should be lightly raked in during the early spring.

Soft fruits, such as gooseberries, black currants, etc., are particularly responsive to seaweed, probably because of its high potash content and should receive two to five pounds per plant according to their size. Apples and pears may be treated according to size with up to ten pounds for an established standard tree in full bearing.

Herbaceous borders, flower beds and roses should receive 50 pounds per 100 sq. ft., which should be raked in lightly during early spring. Lawns are best treated with finely chopped weed in the fall when the lawn should be spiked with a hollow-pronged fork and covered with half an inch of chopped seaweed. Any slight residue should be swept off with a broom of twigs, prior to mowing in the following spring. This treatment adds vital organic matter to the soil and helps the grass to withstand summer drought. Spring feeding of lawns must be confined to broadcast applications of dried milled weed which should be used at two lbs. per 100 sq. ft. It is essential to avoid adding the weed near the drip line of trees since this will give a slippery patch; higher feed rates should also be avoided, especially in wet weather, for the same reason. Generally speaking, spring feeding of lawns is not nearly as beneficial as autumn feeding, and should be used only when considerations of time have prevented treatment in the fall.

When a May cast of frond is available, it should be used as a mulch, and spread particularly over shallow-rooting plants such as raspberries and roses, and any of the many garden subjects that wilt in hot sun-baked soil.

Supplies of fresh seaweed are naturally restricted to people living within easy access to a rocky coast, but those who make the occasional weekend trip to the sea will find pleasure and profit in gathering a few sackfuls of weed which can be carried in the car trunk. The rockweeds are best for casual collection since they are superficially dry and can be gathered at all times. Dried, milled weed is also available and 100 pounds of such weed is equivalent to 400 pounds of fresh weed. Dry weed can be sustituted for fresh weed and is a good compost accelerator but, of course, it cannot be composted as successfully as fresh weed.

Where an abundant supply of weed is available, it should be collected and spread over the ground to a depth of several inches in the fall and disced in the spring; this is the traditional method in Scotland, where thousands of acres are treated annually in this fashion.

try your luck with begonias

BESSIE BUXTON, MASS.

Written by an internationally famous expert in the culture of these graceful flowers, this article points the way to better begonias.

Seed sowing is a form of propagation which is a favorite with many people. It provides many plants at a minimum of expense and the plants are more vigorous than those raised from cuttings. On the other hand, seedlings are not always true to name, even from species, if they have been grown where insects can cross-pollinate them. Seeds from hybrids usually revert to some of their ancestral characteristics and the resulting plant may be handsome. Unfortunately, many of these seedlings have been distributed, and are either nameless or falsely named, which merely adds to the existing confusion in the begonia world.

Seed sowing calls for scrupulous attention to details and for unremitting care for many weeks, but the reward is heart-warming. Not only will the plant lover have all the plants she wants for herself, but plenty to give to friends and neighbors, or to sell.

There are many methods for sowing seeds, and most growers have worked out their own plan. Various materials may be used—gravel, cinders, sand, leaf mold, peat, sphagnum or mixtures of these. Whatever medium is used, it must be clean, moist—not wet—and well-firmed in the container. A simple way is to use a clay flowerpot saucer, filled with one-half leaf mold and one-half sand, both finely sifted. Since begonia seed is very fine, mix a little—as much as will stick to your fingertip is enough for a four inch saucer—with one-half teaspoon of sand, and scatter lightly over the prepared soil. Press down, but do not cover the seed. Set the clay saucer in water until it is dark and moist, then cover with cellophane or thin white paper, held secure by a rubber band. Make several pin holes in this to admit air. Set the saucer in a warm, shady place until the seeds germinate. As soon as the seedlings are plainly

Photo: Roche

The many-blossomed begonia with its deep-hued, lustrous leaves makes an ideal house plant.

visible, remove the paper and sift a little fine sand over them, repeating once in two weeks.

Once a week, set the saucer in water for a short time to moisten the soil. If the tiny seedlings begin to "damp off" or rot at the soil surface, fill a salt shaker with sterilized, sifted sand and shake over seedlings. Sterilize sand by a thorough heating in an oven.

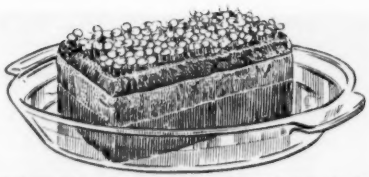
While the organic method generally shuns the process of soil sterilization as damaging—particularly in large scale operations—there are indications that it is sometimes conducive to the subsequent development of beneficial soil organisms.

While the seedlings are still small, thin them with a pair of tweezers, and continue this as they grow. Do not let them become crowded, since this weakens and causes transplanting to be much more difficult. Better to have a dozen strong seedlings than twice as many weaklings.

Photo: Roche

Preparing for the transplanting of begonia plants.

Transplanting may begin after the seedlings have made the second pair of leaves. The new pots should be prepared in advance, filled with a mixture of equal parts of sand, leaf mold and sifted soil. Choose the largest, strongest seedlings, and lift carefully between two matches. Make a small hole and set the little plant in it, being careful to keep the thread-like root straight, without cramping. Then firm the soil gently around the seedling, just to the previous soil-line. If you use a four inch pot, do not set more than eight or ten seedlings in it. If a flat is used, set them in rows, well separated. Pots are easier to handle, especially in watering, which must always be with rain water. Set the pot in water until the soil is moist, then remove and cover with a pane of glass. A match under the edge of the glass will admit a little air. Bottom heat is almost a necessity, but difficult to supply in the house. A high shelf in a sunny window is good, but a thin muslin curtain should be used to temper the sun's heat.



One way to start begonia seed is to use an old-fashioned "brick grandmother" set in pan of water.

When the seedlings begin to look crowded, transplant again, this time into two and a half inch pots. These small pots must be watched, because they dry out quickly. Set them in a pan of moist sand for safety. Seeds sown in May will grow to good size by fall, ready to give you early bloom in your plant windows when the world is cold and gray outside.

Since there are many ingenious ways for the housewife to start begonia seeds, perhaps it would be of interest to describe a few. One of the oldest ways is to use "a brick grandmother." The old-fashioned red clay brick is good, because it is porous. Sterilize the soil and pack a thick layer on the brick, then set in a pan and add water until the brick is half submerged. When brick and soil are moist, scatter the seeds on the moist soil, pressing down firmly. Keep

(*Continued on page 58*)

Another method of starting seed by using wide-mouthed bottle partially filled with soil mixture.

choice cherries from organic orchards

Knowing how to grow healthy cherry trees can bring a multiple bonus to any gardener

LEONORA SILL ASHTON, DEL.

If you are planning to have a cherry orchard or even a few cherry trees on your home grounds this year, the first thing to think of, will be the choice of a site for them to grow.

Young cherry trees are sensitive to cold, so remember to keep them away from regions which are subject to spring frosts. On clear frosty nights the cold air will naturally drain down to low levels. For this reason, slopes or places which are somewhat higher than surrounding areas will be the best location for them. And, if you have a lake or pond on your grounds, plant the trees near that if possible. Water always reduces the danger from frost. Besides, the cool air blowing from it prevents, what frequently proves a peril to young fruit trees– an early flowering in the spring.

As for soil for the cherries, be sure that this is well drained. Given this prime requisite, both sweet and sour cherries will thrive on many different types of soil. It should be added, however, that a sandy loam will always be the best. This will not only provide good drainage, but will also help the trees to a deeper rooting than will lighter soils.

The roots of most cherry trees do not go much below two feet in the ground. While with this shallow rooting the trees may appear thrifty and even produce satisfactorily for a time, a long severe winter or a period of abnormal rainfall will work havoc with them if left in this condition. If set in a sandy loam the roots will easily reach a depth of four feet.

To aid this accomplishment, a valuable gesture at the time of planting will be to mix some peat moss with the soil which you work in around the roots.

Cherry trees need plenty of room. There is good reason for this. The development and ripening of their fruit depends upon sunlight. If the trees are so close together that the branches overlap, they will shade each other and the cherries on them will fail to mature.

If you are cramped for space in your garden, you will likely choose some of the dwarf varieties of cherries. If this is the case, set the trees eighteen feet apart. If you have ground available for larger specimens leave a space of twenty-four to twenty-six feet between; and if you aspire to the large

Cherry blossoms in the Santa Clara Valley, California. *Bob Bishop photo for Don Knight*

growing sweet cherry trees and have room for them, plant these from thirty to thirty-two feet apart.

The old tradition was always to plant cherry trees in the spring. Now, it has been proved that both spring and fall are equally appropriate; but if you do plant in the spring, be sure the place where they are to grow is plowed in the fall.

As for the actual planting, as soon as your trees—presumably at the age of two years—arrive from the nursery, water the roots without delay, and if possible plant them at once. If this is not feasible, prepare a trench in a sandy, well-drained spot, place the trees in it at an angle which slants to one side, fill the trench with soil, and as you do so, work it into the roots. Be sure never to let the roots become dry.

Before you set the trees in the ground, trim off any roots which have been broken or injured in moving, and shorten any straggling ones. Plant the trees where they are to stand and a little deeper in the ground than they were at the nursery. A good way to settle the earth around the roots will be, as you throw the first few shovelfuls in place, to move the tree gently up and down.

Provided the soil of your site is deep and plentifully supplied with nitrogen, you may well grow your

cherry trees in sod. Always remember, though, not to allow the sod to compete with the growth of the trees in using up its needed moisture and nourishment.

If you do decide upon sod, also remember that a mulch will be a necessary accompaniment to it. Use straw, hay or cut up corn cobs for this and do not fail to cut the grass two or three times during May and June.

If your cherry trees are not grown in sod, then a cover crop for the orchard will be necessary. Before this is sown, give the young trees a generous amount of manure or compost, digging it in over the roots but not allowing it to touch the trunks of the trees.

A spring cover crop is sown as early in this season as possible. The best choice for this is rye. Sow this at the rate of one and one-half bushels of seed to the acre, and do not fail to turn it under before the crop matures. Otherwise, it will compete with the young trees.

A late summer cover crop will be of even more value to the cherry orchard than the spring one. For this, use buckwheat, oats or millet. Not one of these will survive the winter, and lying withered on the ground, will add nitrogen to the soil.

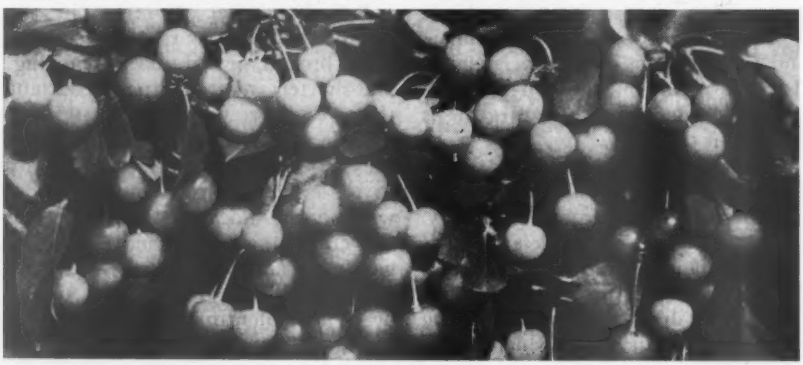
The late cover crop will be best sown when the fruit is ready to pick. According to the weather, this will be sometime during the first two weeks of July. As the season advances, you will find this late crop of value in improving the soil, especially if it tends to be heavy; while in helping to prevent erosion and loss of nutrients, it will improve the wood of the tree during the late summer and fall.

At the time of planting, have the main stem higher than any of the branches. Thin the others from about four to six inches apart, leaving the lowest ones from sixteen to eighteen inches from the ground. After that, cut only to keep the center of the tree free from sprouts and from inward growing branches and those which cross each other.

Although sweet cherry trees produce good pollen, none of them are self-fruiting. Generally speaking, pollination will take place when any of these are planted together, but there are exceptions to remember; namely, the group of sweet cherries composed of Bing, Emperor Francis, Lambert and Napoleon.

The Duke cherries, grown primarily for home gardens because they are noted for their hardiness, are hybrids of the sweet and sour ones. These will pollinate both the sweet and sour varieties.

Cherry trees—of any variety—are a happy gardening choice. They provide a delightful landscaping medium as well as a tasty, nutritious fruit. Given considerate, sensible organic care, they can well be a long-lived, amply-rewarding effort for any home gardener.



COURSE IN ORGANICS

By J. I. Rodale

ORGANIC MATTER

Lesson V — Nitrogen in Humus

ORGANIC matter is the means by which nitrogen is carried in the soil. As the organic matter decays the nitrogen is set free in a form that is available to plants. All the other minerals are also contained in the organic matter and gradually become available as nutrients to plants, but in this lesson we will deal only with nitrogen, because in the question of organic matter it is mainly a problem of nitrogen. Minerals are present in the rock fragments of the soil. The organic farmer can obtain all his minerals from phosphate, potash and basalt rocks, etc., but for him nitrogen is obtainable only in organic matter. Rarely do rocks contain nitrogen. He can, of course, obtain nitrogen from dried blood, bone meal, tankage, etc., but in farming, rarely is money spent for such expensive fertilizers. Adequate nitrogen may be obtained by the farmer from reasonable amounts of organic matter applied to the soil each year.

Nitrogen is an extremely important element in farming and gardening. Without it, productivity of the soil will decline. High productivity is interrelated with the supply of organic matter in a soil. A deficiency of one usually indicates a deficiency of the other. Nitrogen is necessary to the functioning of every cell of the plant, and is needed for rapid growth. It is directly responsible for the vegetative growth of plants above ground. And with a good supply of it, maturity of the plant will come earlier. A lack of nitrogen is indicated by a lightening of the green color of leaves. A great lack of it will show up in the yellowing of the leaves. Of all nutrient deficiencies in arable soils, that of nitrogen is most common. But an excessive supply of it will not only retard the growth period but will reduce the plant's resistance to disease, and produce an inferior quality of crop, which will show up in poor keeping and shipping abilities. It

waterlogs the plant, causing an over succulency. This is where the organic method is superior. The organic matter, unless a tremendous excess is applied to the soil, gradually feeds the nitrogen to the plants as required, rarely overfeeding them. It is a known fact that organic matter decays slowly, thus not releasing the nitrogen too quickly. The organic matter thus is a valuable storehouse of nitrogen, maintaining an automatic supply for the entire growing season. But with chemical fertilizers, a too enthusiastic hand can sometimes give the soil an oversupply which will lead to all the troubles described above.

PERCENTAGE OF NITROGEN

A very common error is found in most agricultural textbooks and publications dealing with the subject of organic matter. They usually state that on the average, five per cent of organic matter consists of nitrogen. This statement bothered me for a long time because I could see from actual analyses of various kinds of organic matter that this could not possibly be true. At the most, organic matter contains up to two per cent of nitrogen. Finally the basis of this error dawned upon me. What was meant by these agricultural teachers was that *humus* contained five per cent nitrogen. But there is a big difference between organic matter and humus. It is due to a loose and careless handling of the terms *organic matter* and *humus* that this error occurs again and again.

To me this seems most amazing! To see such scientific organizations as the New Jersey Agricultural Experiment Station, the Agricultural Experiment Station of Iowa State College and many others, keep repeating this gross error is hard to understand. When you start out with a corn cob, which is one example of organic matter, you may have something which contains let us say less than one-half of one per cent nitrogen. But when it decays thoroughly and turns to humus, so much of the solid matter has gone up into the air, that of what remains in the humus portion, the nitrogen is approximately one-twentieth of it, or five per cent.

Here, therefore, is a general rule which I have never seen in any agricultural textbook or publication, but which is true nevertheless. No matter how much or how little nitrogen there is in any kind of organic matter to begin with, when it turns to humus, the latter's nitrogen content will be about five per cent.

The following is a list of representative classifications of organic matter and typical analyses with respect to their nitrogen content:

PLANT WASTES

	% of Nitrogen
Beet Wastes	.4
Brewery Wastes	1.0
Castor Pomace	4.0 to 6.6
Cattail Reeds	2.0
Cocoa shell dust	1.0
Cocoa Wastes	2.7
Coffee Wastes	2.0
Grape Pomace	1.0
Green Cowpeas	.4
Nut Shells	2.5
Olive Residues	1.15
Peanut Shells	3.6
Peanut Shell Ashes	.8
Pine Needles	.5
Potato Skins	.6
Sugar Wastes	2.0
Tea Grounds	4.1
Tobacco Stems	2.5 to 3.7
Tung Oil Pomace	6.1

LEAVES

Peach Leaves	.9
Oak Leaves	.8
Grape Leaves	.45
Pear Leaves	.7
Apple Leaves	1.0
Cherry Leaves	.6
Raspberry Leaves	1.35
Garden Pea Vines	.25

GRASSES

Clover	2.0
Red Clover	.55
Vetch Hay	2.8
Corn Stalks	.75
Alfalfa	2.4
Immature Grass	1.0
Blue Grass Hay	1.2
Cowpea Hay	3.0
Pea Hay	1.5 to 2.5
Soybean Hay	1.5 to 3.0
Timothy Hay	1.19
Salt Hay	1.06
Millet Hay	1.22

SEAWEED

Fresh Seaweed	0.2 to 0.38
Dry Seaweed	1.1 to 1.5

MEAL

Bone Black Bone Meal	1.5
Raw Bone Meal	3.3 to 4.1
Steamed Bone Meal	1.6 to 2.5
Cottonseed Meal	7.0
Corn Fodder	.41
Oats, green fodder	.49
Corn Silage	.42
Gluten Meal	6.4
Wheat Bran	2.36
Wheat Middlings	2.75
Meat Meal	9 to 11
Bone Tankage	3 to 10

MANURES

Cattle Manure (fresh excrement)	0.29
Cattle Manure (fresh urine)	0.58
Hen Manure (fresh)	1.63
Dog Manure	2.0
Horse Manure (solid fresh excrement)	0.44
Horse Manure (fresh urine)	1.55
Human excrement (solid)	1.00
Human urine	0.60
Night Soil	0.80
Sheep Manure (solid fresh excrement)	0.55
Sheep (fresh urine)	1.95
Stable Manure, mixed	0.50
Swine Manure (solid fresh excrement)	0.60
Swine (fresh urine)	0.43
Sewage Sludge	1.7 to 2.26

ANIMAL WASTES
(Other than manures)

Eggshells	1.00+
Dried Blood	10 to 14
Feathers	15.3
Dried Jellyfish	4.6
Fresh Crabs	5
Dried Ground Crabs	10
Dried Shrimp Heads	7.8
Lobster Wastes	2.9
Shrimp Wastes	2.9
Mussels	1
Dried Ground Fish	8
Acid Fish Scrap	4.0 to 6.5
Oyster Shells	.36
Milk	.5
Wool Wastes	3.5 to 6.0
Silkworm Cocoons	10
Silk Wastes	8
Felt Wastes	14

As to the possible reason for the common error which exists in the minds of agronomists, that organic matter contains five per cent nitrogen, there may be several explanations. First, it may be due to the fact that their work is 99.999 per cent with chemical fertilizers, and although they speak of the need for organic matter in farming they do not seem to have the strength to convince the typical farmer as to its value. In their work, discussions in regard to organic matter lack a punch, remaining in the realms of the theoretic, and there is therefore not much dealing with it.

Secondly, it is possible that in the mind of the average agronomist the expression *organic matter* may mean humus. If this is so, it is a new one on me, and it is time we get together on a definition of terms. Perhaps the agronomist, when referring to a specific type of organic matter such as alfalfa hay, may use the term *organic materials* as against *organic matter,* but I think such handling of terms would be confusing. We should consider *humus* as the product that comes into being on the decay of organic matter, and *organic matter* as the specific material which is at the beginning of that process. In other words, the terms *organic matter,* or *organic materials* should be considered as one and the same thing.

PROTEIN

Nitrogen is not present, either in the soil or in humus in a free condition. If it were, it would be rapidly decomposed by soil organisms and much of it become lost to growing crops. Nitrogen is present in humus in the form of protein compounds which are highly resistant to microbial dissolution, thus releasing its nitrogen slowly. In raw organic matter, if not carefully handled, much of the nitrogen can become dissipated into the atmosphere in the form of ammonia, which is a compound of nitrogen and which results from the first stage in the breakdown of protein. This is the great value of humus—its ability to hoard its nitrogen for release to plant roots as needed.

About 30 to 35 per cent of humus consists of protein. Proteins contain about 50 to 55 per cent of carbon, 15 to 19 per cent of nitrogen, 6 to 7 per cent hydrogen and 21 to 23 per cent oxygen, with small amounts of sulfur and occasionally some phosphorus. (Carbohydrates, that is, sugars, starches and cellulose, contain only carbon, hydrogen and oxygen.) In other words, proteins containing all the elements of carbohydrates plus nitrogen, sulfur and sometimes phosphorus.

Generally speaking it is considered that about 16 per cent or one-sixth of protein is nitrogen and therefore when the amount of nitrogen in a substance is known, the protein is figured out by multiplying it by 6.25. (16 by 6.25-100.) Not all the nitrogen is in the protein. Small quantities are found in other compounds contained in humus, but these are small in amount.

The release of nitrogen in humus is effected as follows: The protein first decomposes into its amino acids. The next step is the formation of ammonium compounds. Then bacteria break these down into nitrites. There are certain bacteria whose function in the soil is to do this, and only *they* can do it. Then other groups of bacteria turn the nitrites into nitrates, which is the form of nitrogen that plant roots can take in. Sometimes where air is lacking and the decomposition is anaerobic, other compounds besides amino-acids form, which give off putrefactive odors. This usually occurs in protein-rich materials.

ORGANIC VERSUS CHEMICAL NITROGEN

Organic forms of nitrogen are more stable in the soil and become available for plant growth more gradually than nitrogen from chemical fertilizers. When concentrated chemical nitrogen is applied to the soil it produces a "shot-in-the-arm" effect to plant growth. The plants are subjected to too much nitrogen at one time. Then, if a sudden heavy rainstorm drenches the field, the chemical form of nitrogen is, to a large extent, washed out, and the plants become starved for the lack of this element.

Many highly concentrated nitrogen fertilizers are toxic in their effect on earthworms, but it is, probably not the nitrogen that does it. Usually, like cyanamid, it is some other toxic substance that is a carrier for the nitrogen that not only is *not* needed by plants, but remains and accumulates in the soil, to its detriment.

Regarding the difference in quality as between the nitrogen contained in organic and inorganic matter I would like to quote Sir Albert Howard, who in an article *The Nitrogen Problem,* in the January 1947 issue of *Organic Gardening,* said: "The disadvantage of artificial manures like sulphate of ammonia is that the nitrogen is supplied as an inorganic dead chemical. The result is a bastard protein which leads to disease and the loss of the power-of reproduction. This is shown: (1) by the way our dairy herds are afflicted by disease and by inability to bear more than a quarter of the calves they might, and (2) by the way our new varieties of plants run out."

There is an important point involved here. In chemistry we deal with compounds. Compounds are a combination of two or more elements, like nitrogen, oxygen, sulfur, etc. Water is a compound consisting of hydrogen and oxygen and it can be broken down into its separate elements, the building blocks. At times we organic practitioners have let our enthusiasm run away with us. In our fervor we have violated a few of the basic rules of chemistry. We have said that the nitrogen which is in organic matter is different than the nitrogen in a chemical fertilizer. But this is not so. Nitrogen is always nitrogen and phosphorus is always phosphorus. It is like saying that six is always six and eight is always eight. There can be no such thing as a synthetic nitrogen. Man cannot bring nitrogen into being.

Protein is a different story. It consists of a maximum of six elements—carbon, hydrogen, oxygen, nitrogen, sulfur and phosphorus. There can be different proportions of each one of these six. Mathematics can be so fantastic that it has been said that over six billion different combinations of these elements are known. In other words there are over six billion different kinds of protein—so you can see that it is possible for a great variation, and even for a bastard protein to creep in here and there. There are delicate relationships in the formation of compounds. For example water is made up of two parts of hydrogen and one of oxygen. But in hydrogen peroxide the molecule is made up of the same two elements and yet it is a poison. It consists of two atoms of hydrogen and two of oxygen. Only one atom of oxygen more, and yet it can kill.

It must be admitted, therefore, that in the possible combinations of the six elements that make up protein there may be some that spell inferior quality.

We can see that protein is like humus. It has no uniform formula, but varies according to how it originated. If it has an artificial chemical origin, it is greatly possible that the atoms may arrange themselves differently within the molecule than if the nitrogen is of organic origin. Nature has a way of arranging them based on an evolution of millions of years. Man, who only recently came upon the scene, cannot hope to duplicate the chemistry of Nature. In fact no man in any laboratory has ever been able to make protein—even an inferior kind. He has been able to extract nitrogen from the air. But protein is the beginning of life. It is protoplasm and the making of it is in the hands of a power higher than man's

Dr. Selman Waksman, in his book *Humus* (Williams and Wilkins) item 1082, page 484 cites three researches to show the importance of the nature of protein in the soil in improving its ability to feed plant roots. It would seem logical that given defective protein we will have defective plants. In a recent ten year period in the Middle West the protein content of the grains declined ten per cent. This is a terrific reduction for such a short period of time. The question is—did the quality of the protein also decline? If it did, it might be an explanation for the alarming recent increases in the degenerative diseases, for protein builds body tissue. Defective protein—defective body tissue. Defective body tissue may be more susceptible to cancer.

Nitrogen is important, but the way it is held in the protein molecule may be *the* one factor which may control the fate of mankind.

In closing, I would like to quote Dr. George D. Scarseth of the American Farm Research Assoc. of Lafayette, Indiana, who, in 1947 in a bulletin entitled *Organic Matter and our Food Supply*, said:

"Protein foods are nitrogen carrying foods. Every farmer knows that nitrogen and soil organic matter are closely related. Every farmer knows that a soil high in organic matter is also a very productive soil. Every farmer also knows that legumes like clover, alfalfa and sweet clover add valuable organic matter to the soil. The farmers also know that the organic matter from these legumes is better than the organic matter from non-legumes, because clover makes nitrogen into chemical compounds out of the free nitrogen in the air."

NITROGEN IN COMPOSTING

Incidentally materials high in nitrogen content are extremely important in composting, for nitrogen (protein) is the principle food of the bacteria which engage in the decay processes. Their bodies are highly proteinaceous. When the raw materials of composting include highly nitrogenous materials such as hen manure and alfalfa hay the composting is accelerated and the quality of the compost better.

INSTRUCTIONS

Read each question and refer back to the article for its answer. Then read the questions a second time, attempting to give the answers from your mind. In no instance should answers to the questions be mailed to us, nor can we enter into correspondence concerning this course which is primarily intended for the benefit of each reader. Correct your own written answers by comparing with the text of each lesson and mark your work accordingly.

QUESTIONS

1. Why is nitrogen an extremely important element in farming and gardening?
2. How may adequate nitrogen be obtained by the farmer?
3. In what ways is a lack of nitrogen indicated in plants?
4. What effects does an excessive supply of nitrogen have on plant growth?
5. How do the organic method and the use of chemical fertilizers differ in the matter of releasing nitrogen to plants?
6. What is the approximate nitrogen content of any kind of organic matter when it turns to humus?
7. Give one of the possible reasons for the common error of many agronomists in stating that organic matter contains five per cent nitrogen.
8. In what form is nitrogen present in humus?
9. Explain the release of nitrogen in humus.
10. What factors determine the make-up of the great number of different kinds of protein? How is this important?

REVIEW QUESTIONS

How well have you retained the essentials of Lesson IV? Here are a few review questions which have been simplified and are answerable by *True* or *False*. Test yourself (avoid guessing) and then check with the answers on page 63 of this issue.

1. When either raw organic matter or finished compost is placed in the soil, decay begins to take place.
2. Fresh organic matter added to a soil slows the rate of decomposition of the existing soil organic matter.
3. Aeration is one of the four conditions that make it ideal for micro-organisms to aid in decomposition.
4. A certain amount of carbon dioxide is important to the production of crop yields.
5. Under no conditions does the decomposition process stop.

Readers are urged to study the concurrent course on "The Soil" in *The Organic Farmer*, Emmaus, Pa., $3.00 a year; $7.00—3 years.

I saw a miracle

Transforming a coarse backyard slope into a fertile garden

HERBERT C. WHITE, CALIF.

LAST night I saw a miracle! Fig trees planted in late April, loaded with luscious fruit in early October. Raspberry vines, planted in late July, with fruit-laden terminals three months after planting. Grapes planted in May bearing well-formed bunches

of nectar-filled fruit of the vine five months after planting. Lemon trees planted in July, pushing out beautiful three-foot terminals covered with glorious foliage, and, believe it or not—lemons the size of plums already forming on the branches!

But that is not all. I saw a baby prune tree, planted April 9, 1952, stretching 11 feet, 9 inches up into the blue—a beautiful plum tree covered with dark, lustrous foliage 103 inches tall only five months after it had been set in the hole—an infant peach tree with a spread of 88 inches, and 7 feet 10 inches tall, with 65 inches of new terminal growth since the end of April—a gorgeous apricot tree 92 inches from one drip line to the other, and over 7 feet tall five months after planting!

Charlotte and Joe Merrik of Sierra Madre in suburban Los Angeles, California, had a few square yards of land on a steep, formidable looking hillside. The soil? Just about coarse decomposed granite. And yet they wanted a fruit garden—and worked the right way to achieve it!

Given impetus by an interest in better foods, the Merriks sought aid and materials for converting their 65 by 75 feet back yard into a productive miniature orchard. Joe did the initial work of excavating steep banks, building retaining walls, and leveling terraces. Then, despite the liberal gifts of fine ornamentals and a variety of deciduous and citrus fruit trees from a family friend, they paid no heed to his advice to use the standard commercial chemical fertilizers, sprays, and so forth. Instead, the Merriks turned to the author whose suggestions for organic care were eagerly followed. Soil amendments—organic, that is—were secured and applied carefully. These included compost, leaf-mould, trace minerals, peat-moss, raw phosphate rock, earthworms, topsoil, and stones I had recommended for mulching and drainage. The result? In less than six months they have twenty-four varieties of fruits and berries, an herb garden, a compost pit, a lily pond, an earthworm culture bed, and a vegetable garden.

The author, soil biologist, Rukuhia Soil Research Station, Department of Agriculture, Hamilton, New Zealand studied the effect on earthworm populations of the soil content of minerals, and his findings, somewhat condensed, are reprinted as being of great interest to all our readers.

effect of soil minerals on earthworms

Reprinted from "Compost Magazine," publication of The Compost Society of New Zealand

R. L. NIELSON, NEW ZEALAND

earthworms and minerals

Attention was concentrated mainly on the species being investigated, A. caliginosa, but consideration was given also to other species which appeared in the soil—in the main, members of an introduced European family, the Lumbricidae. At all places examined several square-foot samples of earth were dug and all the worms they contained collected carefully. These specimens were preserved in three per cent formalin and the collections later examined to ensure that the field identifications were correct.

The densities of A. caliginosa in the tabulations of results which follow are shown as numbers per square foot. Each number represents the mean of several square-foot samples, usually three or four, which frequently were taken under conditions adverse for accurate sampling, so no high degree of statistical accuracy can be claimed for them as samples of a population.

The so-called quick test used extensively by soil chemists of the New Zealand Department of Agriculture was applied in this survey. The test is used to analyze a soil sample for its content of the elements calcium, potassium and phosphorus. The purpose is to show the quantities of these elements available for absorption by plants, and the test is designed to exclude non-available components from the result. In addition, soil acidity is measured and expressed as units of pH, pH7 being neutral, figures lower than 7 denoting degrees of acidity, and those above it denoting degrees of alkalinity. In this article figures for calcium are given as parts per 10,000 of oven-dried soil and those for phosphorus as parts per 100,000. The level of potassium (or potash) is indicated by the expressions "low," "medium," "high" and "very high."

Though available plant nutrients often vary widely in different soils, average fertile soils contain from 14 to 20 parts per 10,000 of calcium and from 5 to 10 parts per 100,000 of phosphorus, with potash contents ranging from high to very high. These three elements are by no means all the nutrients required by plants, nor is an analysis of the very important element nitrogen given by quick-test estimations.

potash

The relation of the potash content of the soil to the densities of earthworms found in the survey is shown in table I.

Though only 47 collections are tabulated, it seems clear that the potash level has no apparent direct effect on the earthworms.

There seems no doubt that a very low potash level would restrict plant growth and thus limit the ultimate amount of available plant material,

but no profound effect of this is discernable from the figures given. At low potash levels quite high densities of earthworms have been obtained, whereas in the five places where they failed to establish (but could have been expected to have done so because they were present elsewhere in the vicinity) the test gave medium and high potash values.

Table I

Potash of soil status	Earthworms A. caliginosa (Mean numbers per square foot)				
	Absent	1 to 10	11 to 40	41 to 80	More than 80
Low	—	—	—	2	—
Medium	1	1	4	2	—
High	4	2	5	2	—
High to very high	—	4	1	—	1
Very high	—	3	4	6	5

phosphorus

Evidence in table II seems to point to the fact that soil phosphorus is also a factor of no serious importance in earthworm distribution.

Where A. caliginosa failed to appear, phosphorus levels ranged between 1 and 5 parts per 100,000, yet high numbers were obtained at figures lower than 1. On Mr. Ashmore's property (near Raetihi, N. Z.) 95 A. caliginosa to the square foot were obtained in a pasture with a phosphorus value of 0.9.

Table II

Phosphorus (as phosphorus pentoxide): Parts per 100,000 of oven-dried soil	Earthworms A. caliginosa (Mean numbers per square foot)				
	Absent	1 to 10	11 to 40	41 to 80	More than 80
Less than 1	—	5	—	2	1
1 to 1.5	2	4	4	3	—
1.6 to 3	2	1	4	3	2
3.1 to 5	1	—	4	2	3
More than 5	—	—	2	2	—

calcium

Figures for calcium show a rather different picture. The distribution of earthworms relative to the lime content of the soil is shown in table III.

Only one pasture with a calcium level below six parts per 100,000 contained any A. caliginosa. The exception was on one trial near Eketahuna, where two worms were found near the pegs marking the spot where they were originally placed in the soil; in all likelihood they were survivors of those introduced experimentally in 1945, as no more were found either at the pegs or in the surrounding pastures. However, collections from which A. caliginosa was absent yielded a few specimens of other species of introduced earthworms such as Lumbricus rubellus and Octolasium cyaneum; probably they are less sensitive to lime deficiency than A. caliginosa.

No soil having a calcium level of eight parts per 10,000 had a density higher than ten A. caliginosa per square foot, so a higher level than this seems essential if the earthworms are to be expected to thrive.

However, the margin between the lime level deficient for worms and that

at which they will flourish is quite small. A year's sampling on a grass plot with a calcium level of 12 parts per 10,000 at Rukuhia Soil Research Station gave an over-all average of 92 earthworms per square foot. No upper limit for lime is known, as a healthy colony of mixed species was found on a farm near Te Awamutu in soil which contained 36 parts of calcium per 10,000. The deficiency level seems to be constant regardless of the origin or structure of the soil.

Many references occur in writing to the fact that earthworms thrive only in soils either alkaline or near neutrality, writers seeming to place emphasis on soil acidity as expressed by pH. W. J. McL. Guild in an earthworm survey of some farms in Scotland noted that certain pastures which had been limed a few years previously maintained a much higher population of earthworms than did unlimed, naturally acid pastures on the same farm. His conclusion was that: "Acid soil supporting rough herbage is not a suitable environment for a large, well-balanced population of worms." The present contention is that it is not soil acidity of itself, but more specifically the shortage of calcium, which discourages them.

The part this element plays in the physiology of earthworms is unknown. A good deal of the lime they ingest is excreted in the casts. J. D. Robertson showed that the calciferous glands, which open into the forward part of the digestive tract, eliminate calcium from the blood stream. Whatever the inorganic calcium salt he fed them, it was always converted in the body to calcium carbonate and secreted into the cavity of the gullet section of the tract. Organic forms of calcium did not lead to such excretion, as probably they were not assimilated. Certain uncompleted pot experiments at Rukuhia point to the possibility that a suitable level of soil calcium is needed not only to maintain the health of the earthworms, but also to permit normal rates of reproduction.

A major consequence of this need for calcium is that a large part of New Zealand lime-deficient soils will not derive the undoubted benefit of earthworm activity unless the concentration of calcium can be maintained at ten parts per 10,000 or higher. Frequently a valley in which the soil is adequately supplied with both calcium and earthworms is bounded by hills and ridges which are so low in calcium as to prevent the existence of the worms. In such areas it seems unlikely that aerial or other topdressing with phosphate alone will induce migration from the lower, worm-populated pastures to the higher levels.

That A. caliginosa will spread given sufficient lime is shown by the fact that this species of its own accord has found its way into the tussock hinter-

Table III

Calcium: Parts per 10,000 of oven-dried soil	Earthworms A. caliginosa (Mean numbers per square foot)				
	Absent	1 to 10	11 to 40	41 to 80	More than 80
2	2	1	—	—	—
4	1	—	—	—	—
6	2	4	—	—	—
8	—	4	—	—	—
10	—	1	2	—	—
12	—	—	4	—	—
14	—	—	3	2	2
16 or more	—	—	5	10	4

land of Canterbury's mountains. On a shingle fan at the foot of a mountain near Cass where an analysis showed 12 parts of calcium per 100,000 of soil, the worms are present at density of about ten to the square foot. Doubtless the hot, dry weather in summer will restrict their numbers, but the fact remains that they have spread there though 40 miles of rugged hill country lies between Cass and the pastures of the plains.

water also essential

Some half-dozen collections were omitted from the figures in the tables which have been given. These samples were taken mainly from very steep slopes in districts subject to summer droughts. The calcium level in each case was satisfactory, but the worms were either absent or there in only very small numbers. Field observations indicated that the supply of moisture was below that necessary for the maintenance of a healthy worm population.

An instance is provided by a farm near Tolaga Bay, where a survey showed that on the steep hill slopes the population of all species of earthworms was nine per square foot, though a soil analysis gave satisfactory tests for potash and phosphate, and the calcium content was 24 parts per 10,000. However, on one declivity was a damp hollow which appeared to receive moisture throughout the year by seepage from the slopes above. Here earthworms numbered 135 per square foot, of which 106 were A. caliginosa, yet the soil contained considerably less phosphate and only 16 parts of calcium per 10,000. Clearly, the moisture on the surrounding slopes was insufficient to support a bigger worm population, even though the soil minerals were in better supply than they were in the hollow. Moreover, as a result of the extra moisture, the hollow would provide more forage throughout the year, which in turn would provide more food for the earthworms both from plant material and from manure dropped by sheep grazing there.

other minerals

The effects on earthworms of soil deficiencies or excesses of minor elements such as cobalt, manganese, iodine and molybdenum apparently have not been studied. Among the many known toxic minerals, however, copper is familiar to green-keepers as being useful in reducing the incidence of worms and hence of their casts. As copper sulphate is often used as a pasture dressing, it would seem of interest to know what level in the soil is tolerated by worms. No accurate experimental data is available, but at Rukuhia Soil Research Station an

(*Continued on page* 46)

Table IV

	Approximate distance from centre of flow	Number of earthworms per square foot	Soil depth (in.)	Copper (parts per million)
Affected Soil	4 feet	None	(0 to 4	360
			(4 to 8	256
	4 to 6 feet	2 to 6	(0 to 4	266
			(4 to 8	176
	6 to 10 feet	26 to 40	(0 to 4	144
			(4 to 8	66
Normal Soil	100 feet	80 to 100	(0 to 4	48
			(4 to 8	40

The Organic World

DOCTOR WARNS OF HEALTH DANGERS IN HANDLING INSECTICIDES

Urging great caution in the use of chemical insecticides, Dr. Carlo Marmo, M.D., has indicated an often overlooked factor in regarding the very potential harm contained in today's commercial insect killers. That is: present-day insecticides are many times stronger—and more dangerous to humans—than any of the sprays first used when this artificial mode of supposed pest protection came into vogue. In a feature item of the March 15, 1953, *Miami Daily News,* Dr. Marmo stressed the recurrence of many symptoms experienced by persons using these compounds, particularly the vaporizing types. These reactions, he states, range from simple congestion of the membranes of the mouth and nose to severe headache, nausea, vomiting, convulsion and even death. Emphasized also in the article were the hazards latent in many new gagdet ideas which are marketed as light bulb attachments that gasify the insecticide.

POISON WASTES KILL FISH AND WATER BIRDS AT NIAGARA

Ill or dead water birds were reported being swept over Niagara Falls recently, and one adamant opinion was that they had been poisoned by eating fish contaminated by toxic industrial wastes dumped into the water. While reasons for both the fish kill and the subsequent resulting death of the water birds differed among sanitary chemists and others making an investigation, the *Buffalo Courier-Express* of March 24, 1953, reported that the area delegate to the State Conservation Council, Stanley P. Spisiak, had stated emphatically the contention that the gulls and ducks were killed by the waste-poisoned fish.

CODLING MOTH RUSHES EGG-LAYING IF TREATED WITH DDT

Codling moth females apparently act quickly to overcome the effect on future population from use of DDT, according to information in the annual report on fruit insect research from the Division of Entomology at Ottawa. Quoted by *The Annapolis Valley* (Nova Scotia) *Post Road* of March, 1953, the report points out that while the female codling moths normally deposit eggs only in the evenings and at temperatures of sixty degrees or higher, they will when treated with DDT oviposit the eggs within half an hour regardless of temperature, humidity or light conditions. Citing the importance of insect-eating birds as the wisest and most effective control factor, the study also revealed the fact that the insecticide treatment resulted in more codling moth eggs being laid within a given time.

DISPOSAL UNIT BRINGS ORGANIC FERTILIZER IN ISRAEL

A modern plant for the conversion of garbage into organic fertilizer has recently been constructed and soon goes into production in Tel Aviv, according to the *Chemical and Engineering News* of November 17, 1952. Estimates are that the waste collected in Tel Aviv will yield about 60,000 tons of organic fertilizer per year, an amount which represents about 40% of the needs in the southern area of the country.

TESTS SHOW ORGANIC MATTER CUTS CORN AREA SOIL LOSS

Soil losses in the nation's corn belt can be cut by nearly 40 tons per acre through the use of organic matter applied to plots at planting time. So reports the Agriculture Research Administration which has been conducting experiments over a period of seven years aimed at lowering the loss of soil and soil fertility. Researchers, according to the Erie, Pa., *Times* of April 1, 1953, explained that recent tests have shown that applying manure and straw between late June and harvest time almost completely ended soil loss, and also cut the runoff of rain water to about half that of the bare plots. These coverings are reportedly very effective in keeping moisture on the ground during hot summer days, and therefore lead to higher yields than on non-covered fields.

INDIANA GIRL TESTS SOILS, POINTS WAY TO IMPROVED FARMING

A 16-year old girl who came here recently from Germany has accomplished the project of analyzing the soil in a farming township in Indiana with the hope of getting better yields. She is Barbara Erika Hopf of Bloomington, Indiana, who states:

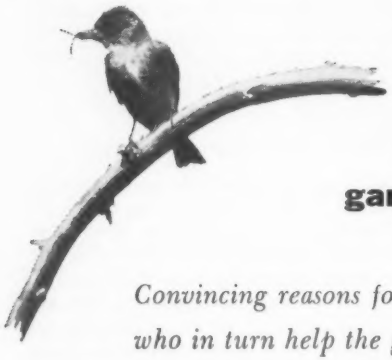
"Living in southern Bavaria, Germany, for a good part of my life, I have been used to the conservation and extreme patience taken by the mountain farmer with his little plot of poor, sticky ground. Yet many hill farmers of southern Indiana, planting corn year after year, get discouraged with poor yields, let their soils erode and finally abandon their farms."

According to a *Science News Letter* item of February 21, 1953, she believes that there should be a better understanding of the material farmers work with: the soil. Collecting and analyzing about 125 soil samples, chosen according to vegetation covering and topographic location, Miss Hopf was able to map the concentration and location of organic matter, of calcium and other fertility factors.

WASP SPECIES INJECT ENEMY INSECTS WITH NATURAL PESTICIDE

Intricate and amazing indeed are many of the ways and provisions of nature. Consider, for example, some families of wasps that are equipped with a natural venom through means of which they paralyze their insect prey by stinging. Recent research conducted by R. L. Beard of the Connecticut Agricultural Experiment Station at New Haven, and reported in their Bulletin No. 562 of December, 1952, reveals that one of this predatory species, the *Habrobracon,* subdue their victims—the *Galleria* larvae, an insect pest—by injecting into their bodies a paralyzing venom. There ensues a period of almost total immobility, following which the larvae die and become food for the wasps. It is worthy of note that this injection, contrary to the undesirable effects of modern chemical insecticides, leaves the prey non-toxic to the beneficial predators and, of course, in no way upsets the phenomenal balance of nature.

The birds will protect your vegetables from insects, if you will give them half a chance!



help for the garden *EE* rs

Convincing reasons for aiding our feathered populace—who in turn help the gardener amazingly

G. BARTLETT HENDRICKS

You may have been singing the praises of birds for years, but plant your first vegetable garden and learn from experience how really useful birds can be!

Those who do not realize what allies birds can be, will be kept busy from morning to "Mazda" combating some infinite number of crawling, hopping, running, gliding, flying and wiggling insect pests.

The entomologists, the lads who make a life study of insects, have already described over 625,000 species, and the number is growing hourly.

The speed with which insects increase staggers the imagination. A pair of potato beetles would produce 60,000,000 offspring in a single season, if unchecked. The insects would have run man, for all his intelligence, right off the planet long ago, did not the weather, disease and other living creatures act as automatic checks on their populations. Insects are eaten with alacrity by most living creatures, including other insects. And far from the least of insect-enemies are the birds, particularly the common or garden variety.

The fellow who originated the simile "a birdlike appetite," must have been speaking facetiously, for an old grandmother of a bird, and one not feeling up to scratch either, can eat in a way which would put a hog, or even a ten-year-old boy, to shame. Birds operate under a much higher head of steam than we do, and many species will actually starve to death if they do not eat almost constantly. Young robins will consume half their own weight a day, and ask for more. This is equivalent to a man eating seventy-five pounds of food every twenty-four hours.

Birds' stomachs are large, and will stretch to hold an astonishing amount of food. A flicker's stomach was found to contain 28 fat white grubs, for example, while a nighthawk's contained 340 grasshoppers, 52 bugs, 3 beetles, 2 wasps and a spider for good luck!

Some of us complain at having to feed the baby five times a day, but a male purple martin was observed to visit the nest 119 times in one day, while the more ambitious female crossed the family threshold no less than

193 times carrying insects to the young swallows.

The next time you feel your temperature rise at the sight of a few sparrows gobbling up five cents' worth of newly sown grass seed, you might recall that in Iowa, alone, tree sparrows are known to consume over 800 tons of weed seeds annually; that 9,200 seeds, chiefly of noxious weeds (such as wood sorrel, barn grass, slender joint-grass, orange hawkseed), have been found in the stomach of one mourning dove; or that the rose-breasted grosbeak, one of our most beautiful song-birds, would rather eat himself under the table on a diet of potato beetles than anything else you can name.

California orchards have several times been saved from outbreaks of canker-worms by Brewer's blackbirds, which flocked to the rescue and cleaned up the pests. In Colorado, red-winged blackbirds have saved crops of sugar beets from "beet worms." At Wareham, Massachusetts, robins made short work of cleaning white grubs out of a bog and saved the cran-

(*Continued on page* 44)

The towhee scratches among dry leaves on the ground, seldom going into the treetops. In early spring it unearths many dormant insects, destroying them before they have had an opportunity to breed. Small nocturnal moths, potato beetles, cabbage worms, grasshoppers, cockroaches, flies and beetles are favorite foods. Towhees prefer wild berries to cultivated fruit.

Photos: Allan D. Cruickshank from National Audubon Society

practical pruning . . . Part IV

Ornamental Trees and Shrubs

FLORENCE HOLMES GERKE, OREGON

Concluding this valuable series with a practical review of this aspect of decorative tree and shrub care

It is not necessary to prune all ornamental plants every year. The common saying, "It is time to prune my shrubs," is based on the erroneous idea that all ornamentals are pruned yearly, regardless of their condition.

Here are some of the good reasons for pruning:

To remove dead or injured members. This work should be done whenever you see dead or injured parts of the plant.

To check the growth of plants where space is limited. This is not an ideal procedure but if you want to grow certain types of plants that tend to be too large for your grounds, you can do some intelligent pruning that will keep the plants within bounds for a limited time.

To thin plants that have become too dense to admit light and air to the area in which they are planted.

To encourage root growth by root pruning at the time of planting.

To alter intelligently the form and size of plants for design purposes. The pruned hedge and the scupltured plant are examples of this form of selective pruning.

To rehabilitate shrubs that suffer from neglect or poor growing conditions.

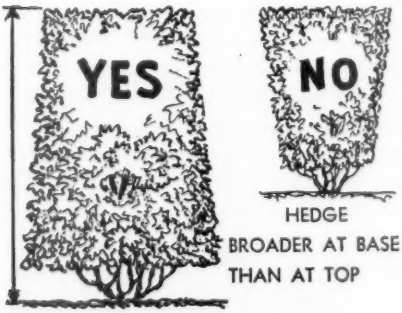
The time of pruning varies with the type of plant that you want to prune and with the results that you wish to achieve through pruning. Some pruning is done at any time suitable to the gardener's convenience; some pruning must be done at a specific season.

THUMB AND FINGER PRUNING PINCH OUT TERMINAL BUDS

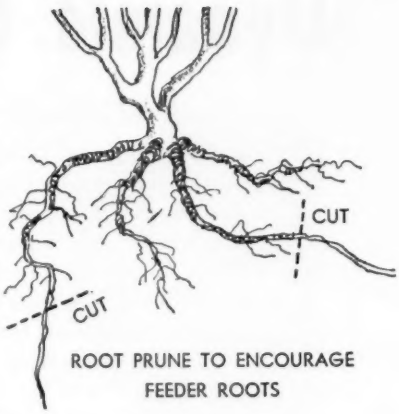
Since flowering shrubs and trees are grown in great part for their blossoms, one should strive to encourage and save the flowering wood. The best time to prune most flowering shrubs and trees, therefore is shortly after flowering. Although it is not necessary to prune many of these shrubs throughout their lifetime, certain sorts

benefit by removal of sucker growth, the occasional removal of old wood and a little heading back to control the general shape of the plant. This is also true of flowering trees and the hawthorne is one that needs pruning more frequently than most of the others. The hawthorne sends out many "water sprouts" or suckers which are often sterile and just fill up the head of the tree. Crabapples also benefit by removal of sucker growth. Remember that the natural form of the shrub or tree is usually beautiful and should be preserved.

Prune evergreen plants such as rhododendrons sparingly and for good reasons only such as removal of dead or injured parts, removal of an occasional random shoot that tends to spoil the fine form of the plant. Rhododendron, camellias, Pieris, skimmia and many other broad leaved evergreens require an absolute minimum of pruning, but if you prune them do so immediately after flowering. Early spring to mid-summer is the preferred time for pruning English laurels, hollies and other broad leaved plants that are used for hedges and screens and are kept to a rather regular width and height. Deciduou shade trees and fruit trees can be pruned (if they are used as shade trees) in the winter, but you may wish to do additional pruning in summer when the trees are in leaf. At that time the trees may be thinned if they require more light and air.



HEDGE BROADER AT BASE THAN AT TOP



ROOT PRUNE TO ENCOURAGE FEEDER ROOTS

Hedges which grow rapidly may require more than one pruning in a season. You may need to prune them in spring and again in the middle of the summer. Keep the base of the hedge slightly broader than the top at all times. The hedge will look better and will suffer less from ice and snow loads if it is tapered from a broad base to a narrower top.

Pruning heavy members of big trees is not a good job for the amateur, but if you want to undertake this work, in part the limb you are sawing off before you start to cut from above. This will prevent possible tearing of the bark and injury to the tree as the heavy limb falls. You can then saw off the stub that remains. Always remove stubs on trees and shrubs and cut back cleanly to the larger member. Paint large cuts with material which is made for the purpose.

There are many types of pruning tools, but one of the best and most convenient devices for small pruning is the combination of your thumb and forefinger. You can fashion many small plants to your bidding by constant and careful pinching back of soft growth with your thumb and forefinger. Terminal buds of conifers can

(Continued on page 42)

"Dynamic Good Health Is

A MESSAGE FOR PEOPLE OVER 35

In ***Prevention,*** the dynamic health magazine published by J. I. Rodale, a recent article contained this statement: "Nutritionists have shown that a correct, natural diet, included ample vitamins and minerals, will do more to prevent the ravages of old age than anything else."

If you are over 35, there probably are times when (for no apparent reason) you feel weak, tired, "run down." Do you know that in many people this "middle aged feeling" is caused by nothing more serious than deficiencies in the daily diet? One way to combat "middle" aged feeling" and to help regain true zest for living is to ***make certain*** you are getting an adequate ***daily supply*** of all-important Vitamins and Minerals.

Take a tip from Bernarr MacFadden. Try FalMay MASTER FORMULA.

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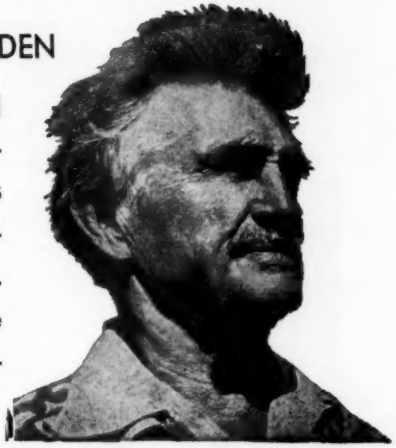
What's the answer? How can you protect yourself (and your family) from deficiencies which may endanger health and often contribute to "let downs" in energy and vitality? A simple, easy way is to supplement your daily diet with Vitamins and Minerals in ***concentrated*** form. But remember . . . to replace ***all*** the vital factors missing from your diet you must insist on vitamins and minerals prepared ***only*** from natural foods.

FalMay's MASTER FORMULA is an all-inclusive Vitamin-Mineral supplement. Made from 100% natural vitalized foods. Includes the dramatic new factors: purified edible Bone Meal (for natural minerals), Wild Rose Hips (richest natural source of Vitamin C) and Vitamin B-12 featured in Reader's Digest in a story of blood regeneration that has thrilled thousands. Provides a ***balanced combination*** of those factors which adults who like "soft" foods often miss in their regular diets. Also contains a plentiful supply of certain vitamins and minerals known to be especially valuable for children in their formative years.

Is Your Natural Heritage"

. . . says BERNARR MACFADDEN



And today at AGE 85 this renowned physical culturist says: "I sincerely believe that all the users of FalMay's MASTER FORMULA will derive beneficial results from it . . . just as I have. It is an ideal vitamin-mineral capsule plus B-12 compounded only from natural and organic sources."

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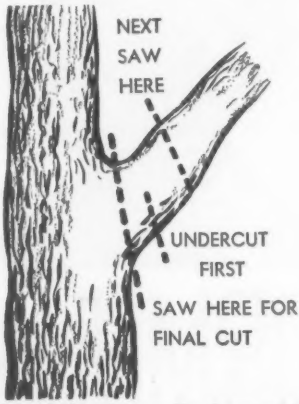
practical pruning

(*Continued from page* 39)

be nipped out and the plant somewhat dwarfed. As you walk in your garden, nip off random growth, break out small twigs and branches that interfere with the form of the plant or with its size. This is a continuing operation to be done whenever the need arises.



Disbudding is usually done with the thumb and forefinger or can be done with a small sharp knife. The object is to produce fewer and handsomer blooms and is practised on roses, chrysanthemums and many other flowering plants. Disbudding is done early in the season before side buds have fully developed. When the side buds are removed the strength goes into the terminal bud which results in a finer, larger flower.

When shrubs have been neglected and are full of suckers, are ill-shapen, and a tangle of weak growth, you may need to do the most drastic type of pruning—to cut the entire plant right down to the ground. Leave just a few inches of growth. Do this type of pruning in the early spring. The result will be a new top for the shrub that has been cut back. As the young shoots grow they can be thinned or pruned to make a shapely shrub. This method is advised for deciduous plants such as forsythias, snowberries, weigelas and others that are vigorous growers.

The Japanese have brought the art of dwarfing and sculpturing plants to perfection, working for years to achieve the small gnarled plants that they grow in tubs and in rockeries. If you are interested in modifying and controlling the shape of trees and shrubs you must develop patience and an eye for form. Retain the main form that you wish the plant to take and then prune during the growing season, a little at a time to bring the plant to the desired shape. Young junipers and pines respond well to this treatment, but the results are not fully accomplished for many months, sometimes several years.

Pruning is not a mysterious process but a garden technique that requires an understanding of the growth habits of plants plus an intelligent program of plant care and an appreciation of the beauty of plant forms.

New Organic Gardening Clubs

We extend a cordial welcome to the following Organic Gardening Clubs and wish them every success in their programs and work.

Florida

Miami Organic Gardening Club
George A. Legant
4101 N. W. 24th Ave., *Miami*

Indiana

Wabash Valley Organiculturists Club
Mrs. Harriet Francis, Secy.
R. R. No. 1, *Terre Haute*
Jesse Swihart
Route 1, Box 186, *Plymouth*

Michigan

Newport Organiculture Club
Thomas V. Manor, Secy.
Newport

North Carolina

Lincolnton Organic Garden Club
Mrs. J. H. Mauney
504 S. Aspen St.
Lincolnton

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help for the gardeneers

(Continued from page 37)

berries. In a single day, myrtle and blackpoll warblers cleared out a swarm of plant lice which had threatened the poplars in Concord, Connecticut. Meadowlarks, in Washington state vanquished a cricket outbreak.

But let me give you a modest first hand example from my own home in Berkshire Hills in Massachusetts. Last spring we planted our first vegetable garden. Measuring about 25 by 50 feet, it is surrounded on three sides by alders, three species of wild cherries, and a jungle of raspberry and blackberry bushes. It would be natural to expect that we would have a large population of nesting birds.

Six-legged pests, or their agents, undoubtedly inspected the garden, yet we had no damage from insects or reasonable facsimile thereof. The reason was obvious—every time we walked into the garden up would fly from six to fifteen or more birds—robins, catbirds, wrens, warblers, song sparrows and perhaps a brown thrasher or two.

One reason for our success in having our garden patrolled by birds is that all of our bird houses have been occupied each of the three years we have been at our present home. The houses were of the correct design and construction, as recommended by the U.S. Department of Agriculture and the National Audubon Society, and they were placed, not where we thought they would be most attractive, but where the birds would be most likely to occupy them.

Of course, your unornithologically minded neighbors may say that birds do more damage then good; they have actually seen birds pecking at strawberries, stealing cherries or pulling up the corn. It is far easier to see a robin eating cultivated fruit than to notice

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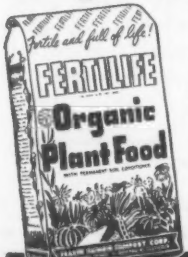

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the same bird devouring cutworms with equal enthusiasm. Being human, most of us are more likely to become excited when we discover that a small bird has pricked holes in our choicest grapes, than when we read that a common warbler, the northern yellowthroat, has been seen to eat 52 caterpillars of the notorious gypsy moth in a few minutes, or that another common warbler downed 80 plant lice in 60 seconds, and that a pair worked at this rate for 40 minutes!

To obtain the best results from birds, a little cooperation on your part is necessary. Mulberries, wild cherries, wild raspberries and blackberries planted especially for them, will prevent them from eating too much of your cultivated fruit. Elderberry, shadblow, blackhow, dogwood, mountain ash, tupelo, juniper, Virginia creeper, honeysuckle, sassafras, spice bush, barberry, and plants of the viburnum and cornus group provide food for birds in various seasons and are sure to attract birds to your area. Besides food, birds need a place to nest, protection, and water.

Just remember that the birds in your bushes will keep the bugs off your beets, if you give them half a chance!

Reprinted from Audubon Magazine, *published by the National Audubon Society, 1130 Fifth Ave., New York 28, N. Y.*

Correction

In the editorial, "Are We Using Too Much Compost?" in the March, 1953 issue, on page 67 it was stated that:

"For a gardener, five tons per acre is an extremely small amount—about one pound for every 22 square feet."

Actually, this figure should read, 'one pound for every 4.35 square feet.

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effect of soil minerals

(*Continued from page* 33)

accidental overdose of soil copper permitted the making of a few observations. The overflow of a foot-rot bath for some time was allowed to filter across a pasture on the slope beneath it, and the soil in the direct path of the flow was deprived of all earthworms.

A copper level near the surface of 260 parts per million was shown to be sufficiently toxic to remove the worm population almost entirely; those earthworms which survived had remained below the upper few inches of soil. Because of the rapid reduction in copper content with increasing depth, an exact lethal value is difficult to assign from the figures. There is a further possibility that had these copper levels been maintained for a longer period, the earthworms would have been even more heavily reduced in number. Since these observations were made the overflow has been diverted into a safe channel.

The toxic figures given considerably exceed those which could result from the usual pasture topdressing of copper sulphate.

THE SOIL & HEALTH FOUNDATION

Very often in seeking funds for agricultural research, we have heard or read the comment that certainly this needed experimenting and investigation is already supported by donations for larger than any average reader could be expected to give. Quite true—but what is the source of most of these substantial offerings? Very frequently and consistently they are the allocations of commercial chemical firms—inevitably limiting the research actually done. A single month's listing of 24 donations for agricultural research to one of the nation's largest universities included 15 from chemical companies! How can we be assured of a thoroughly balanced, unbiased research program? Only by the support of enough people sincerely interested in furthering better living and health through better soil. The Soil and Health Foundation *can* be enabled to make similar grants to prove our point of view. *You do count!* Make *your* contribution, no matter how small to:

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Dept. O.G., Emmaus, Pennsylvania

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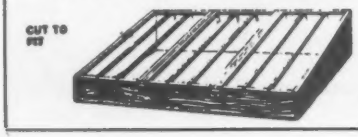

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July

the north

• Mulch all long-season growing vegetables, such as tomatoes, celery, asparagus, to conserve soil moisture during hot summer weather.

• Plant late planting of sweet corn, string beans, beets, carrots.

• Transplant late cabbage, cauliflower and broccoli.

• Make a seeding of oak leaf lettuce.

• Pinch back mums to develop shoots; center bud is never a good flower, always being small. When dahlias are 6-8 inches high, pinch top two buds off.

• Keep cutting sweet pea blossoms to prolong blooming period, otherwise the plants will go to seed and stop blooming.

• Buds of roses which have finished blooming should be cut back to encourage new growth for second bloom.

• Transplant late celery and at end of July transplant endive.

• Late head lettuce may be seeded now.

• Additional fertilization of the above three second-crop items could be in the form of additional compost, rock phosphate and rock potash.

• Pick sweet corn early in morning and keep in a cool place if not used immediately.

• If you have not already thinned the fruit on your fruit trees, this operation may be done now so there is adequate space to allow of maximum growth of individual fruit.

• Mulch flower beds with lawn clippings and any refuse leaves that may be raked up.

• Cut first flowers of annuals to make them continue blooming.

the northwest

Eleanor McConnell, Oregon

• Vacation ahead! This year, with good basic preparation, there need be no worrying about the garden while away. If a mulch has not already been put on, see that everything is well-covered and watered before leaving. Spread straw, chopped hay, leafmold, compost, or grass clippings. Put peat around evergreens and stone chips or gravel in rock gardens.

• For that difficult task of raising plants from seed in midsummer, use a mixture of peat moss, vermiculite, compost and topsoil for germinating. This mixture can be kept damp but not soggy.

• Some quick-growing annuals, such as small Mexican zinnia, calendula, nemesia, can be planted west of the Cascades in July and will bloom during the lovely fall days.

• Seeds of most perennials may be planted in July. The seeds of pansies, primroses and delphiniums will germinate more readily when fresh.

• Divide iris after blooming. Heavy soil is a liability for iris, and much humus is needed. Bone meal or rock phosphate may be added to the soil.

• Keep the Fourth of July in mind as the last date to nip off the top of the chrysanthemums. After that the plants need time to form their buds. Apply bone meal in July. It won't burn and releases plant food very slowly.

• Time now to transplant those vegetables for your winter garden: cabbage, broccoli, celery, cauliflower, and the new Northwest vegetable, caulicab.

• Be sure the tomatoes are heavily mulched as they need an even moisture supply. If blossom-end rot appears, they need more water, but give it moderately.

• Water cucumbers, squash, melons liberally. A can with small holes punched in the bottom or a leaky crock may be placed close to the plants and filled with water regularly. The water, leaking out slowly, keeps the plants supplied with water at all times.

• Watch your compost pile so that it doesn't get too dry.

• Continue to prune the shrubs which have bloomed. They can then start an uninterrupted period of growth and bud formation.

• Renew the mulch of peatmoss around the broad-leaved evergreens. Sprinkle a handful of cotton-seed meal on top of peat around each one. Water down slightly, so the wind can't blow it away.

• Do some spots in your garden or lawn seem hard as concrete? That's probably where they were walked on in the spring when the ground was wet. Stir the spots up and mix in compost or leafmold.

the south

Brent Senay, Georgia

• There is still time to get a crop of bush snap and lima beans, roasting ear corn, cucumbers, eggplant, okra, field peas, peppers, squash and tomatoes. Thoroughly prepare ground, add a generous amount of compost. Mulch well when plants are large enough.

• Plant beets, carrots, Irish potatoes, collards, cabbage, celery, lettuce, Chinese cabbage, turnips, rutabagas, broccoli, cauliflower, mustard greens, kale and radishes for fall and winter crop.

• Good results can be obtained in seed planting, when soil is dry, by opening the row about twice as deep as usual. Fill row with water and plant seed as soon as water has soaked in. Cover with dry soil. Better germination of lettuce may be had by storing seed in the bottom of the refrigerator for several days before sowing.

• Last call for planting gladioli and dahlias. Use compost on dahlias and apply granite dust to strengthen stems.

• Don't let chrysanthemums stop growing. Give plenty of compost and water, and keep mulched. Pinch off terminals through July.

• In Lower South let roses rest by withholding water and plant food until next month. In Middle and Upper South feed roses with compost and soak afterwards. Keep well mulch-

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ed, ground corncobs are the best.

• Poinsettias should be cut back, to encourage branching, now. Cuttings may be easily rooted.

• Narcissus clumps that are too thick should be dug, separated and replanted. The best and easiest time for these three operations is when the foliage has ripened and turned brown, for then you know exactly where to dig and where you'd like to plant them. There is no good reason to dry them out and put off replanting.

• If your wisteria did not bloom well this year root prune it. Hold spade vertically and shove in ground as far as it will go, cutting roots about a foot to eighteen inches from trunk, all around the plant.

• July is the month to root cuttings from oleanders, gardenias, duetzia, clematis, Japanese magnolia and wisteria.

• Get out the hose, turn the water on strong and give your shrubbery a thorough bath at least every two weeks. It is important in the city to rid the plants of carbon and dust on the leaves. Clean plants are less susceptible to disease and insects. Camellias should have a hard spray from underneath the leaves as often as possible in dry weather.

• It is most important to remember that the second summer is the hardest on transplanted shrubs and trees. They have enough inner reserve to survive the first year, but if allowed to dry out will die the end of the second summer. Keep fed, watered and mulched.

• If your hydrangeas are too large prune them back to desired size now. They will produce larger flower heads next spring.

the southwest

Charlotte M. Hoak, California

• Many succession crops and regular hot weather ones are started between the rows. Be careful to observe the proper succession and use plenty of compost on your rows. Everything should be thoroughly mulched. Enrich your rows and holes by working in a good organic fertilizer to give your plants a later boost. Keep flat culture.

• Dry compost continually using every available bit of waste vegetable material. After the heat goes down introduce your earthworms. Droppings from rabbit pens may be had for the asking, and often dairy manure may be scraped up dry very reasonably. Have lawn clippings and dry leaves dumped in your parkway.

• Continue the vegetable directions given in May. The perennial New Zealand spinach is drought-resistant and Tampala thrives in the hot sun. Substitute kohlrabi for turnips. Cabbage is not a summer vegetable.

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• Grow your lettuce in a partially shaded spot. Use Slobolt, Bibb, Salad Bowl and Oak Leaf which are tender and do not get bitter. Great Lakes and Hanson are two good heading varieties. Use Henderson baby limas on heavy soils.

• Try lemon cucumber, a prolific bearer.

• Set as many as possible of the recommended perennials, and replant vacant spaces with drought-resistant annuals either from plant bands or by sowing in place and thinning.

• Sow this season's Pacific hybrid delphinium seed, but do not undertake much seedage work unless you have a good cold frame or seed bed and have had experience in this area.

the organic country store

The Organic Country Store at the Rodale Experimental Farm is open through the summer months. Come in and browse around, 10 A. M. to 4 P. M., any day of the week, including Sunday. It is located just west of Allentown, Penna., off Route 222 toward Emmaus—map available on request.

The Country Store shelves are stocked with fertilizers, mentioned in our magazines: seaweed and dehydrated animal manures, phosphate, and potash rock (granite dust), peat moss and mulching materials, to list a few. There are food shredders, too, to save the vitamins in your garden vegetables; activators to speed the breakdown of the compost pile. Almost everything, in fact, for organic gardening needs, including booklets on all phases of organic gardening. We are sorry—no mail orders.

And while you are with us, take a tour of the farm. There is lots to see.

GARDEN HINTS

elevating potted plants

In arranging potted plants on an indoor window ledge or box, some may be hampered by their leaves being touched and crowded by those of others. Moreover, some may not receive the needed amount of sunlight because the plants closest to the window shade them. A very simple and effective means of making a pleasing and helpful arrangement is to change the level by using tin cans as pot-supports. These can be selected according to the base diameter size of the pots to be raised, and should first be thoroughly scrubbed with a soaped steel-wool pad. Then give them a coating with white pigmented shellac and double application of the rubber-base paint commonly used on flower pots.

support for vines

Galvanized poultry fencing and reinforcing rods (set six to ten feet apart) make a good support for beans, garden peas, etc. Used vertically against the house it makes an excellent surface for scarlet runner beans, morning glories, sweet peas, clematis, etc., to run on. This fencing material will last for years if stored after the growing season.

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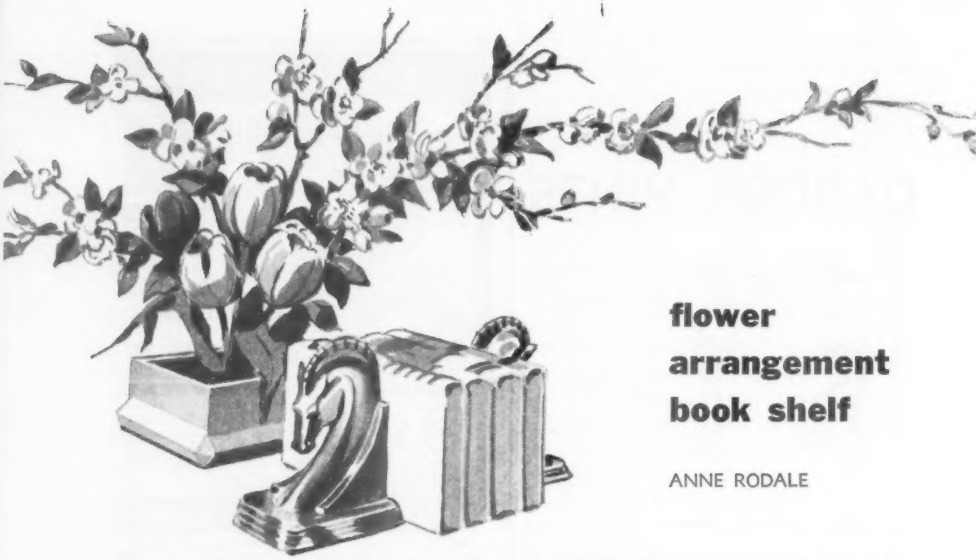

flower arrangement book shelf

ANNE RODALE

Flower Arrangements for Churches by Adelaide B. Wilson. 192 pages, illustrated. M. Barrows & Co., Inc., New York. $4.00.

Mrs. Wilson reveals that many restrictions confront the Flower Committee for church decorations. Flower arrangements must never be bizarre, obtrusive or insecure. Restraint, the author stresses, must be the general rule in all church floral arrangements, and points out that church symbolism and the use of liturgical colors require careful judgment for floral suitability. In dim recesses or where lighting is soft, a flower bouquet made up of light colors, as white flowers in close proximity to figurines have better value if only those of solid form, rather than "frilly" flowers, such as carnations, are employed. Plants have distinctive values, some having linear or outline value while others have profile qualities, and still others require the full form of the flower to be taken into consideration. Understanding these principles simplifies the creation of spiritual and visual warmth. This book is among the few on this subject. Sunday School libraries will consider this volume an important acquisition.

Period Flower Arrangement by Margaret Fairbanks Marcus. 256 pages, illustrated. M. Barrows & Co., Inc., New York. $10.00.

The author studied cave and tomb paintings, ancient sculptures and frescoes, basrelief, mosaics, manuscripts, tapestry screens, travel books, and spent fifteen years in the preparation of this outstanding contribution to flower arrangement literature. Her first chapter, entitled "Early Ways with Flowers and Fruits" covers the period from 2800-28 B.C. down to and including our contemporary twentieth century period. Flower arrangement art deals with Ancient Egypt, Imperial Rome, the Rennaissance, Chinese, Japanese and all the European, French, German, Flemish and English countries. This is a valuable reference book to all artists, fabric designers, ceramists and flower show judges, curators, historians. Mrs. Anson Howe Smith of Boston, writer and lecturer on historic uses of flowers, assisted in the selection of modern illustrations. This work, so painstakingly prepared and so entertainingly written, merits first place in our flower arrangement book shelf.

The Complete Book of Dried Arrangements by Raye Miller Underwood. 193 pages, illustrated, indexed. M. Barrows & Co., Inc., New York. $4.95.

More and more interest is shown today in dried flowers, foliage and grains, which look and smell fresh and colorful as though just picked. These dried materials can be used, Mrs. Underwood states, in a more versatile fashion than is possible with fresh material. A new list of petaled beauties is added to the long list of flowers in use for drying. The author shows how it is possible to develop an elegant curve in an otherwise straight stem. The book is full of provocative ideas and is generously illustrated, with pictures of charming French wall brackets and mantel swags, made up from such unique material as seed pods, pine cones, St. John's bread, dried apples, a bit of rope, etc. Anyone who enjoys collecting driftwood, seed pods and other fascinating materials suitable for dried arrangements, will wish to include this volume in his or her collection.

Flower Arrangement Workbook No. 1 by Myer J. Brooks. 64 pages, illustrated. M. Barrows & Co., Inc., New York. $2.50.

The timid beginner will welcome the novel style of presentation in twelve easy lessons which, collectively, show one how to create a highly effective arrangement. The mechanics are carefully listed so the reader, if a beginner, will have the necessary basic training to achieve effects that could well rank with those created by the more experienced flower arranger. Scout and girls club leaders especially will find in this book a source of inspiration as it provides a subject which the girls will enjoy.

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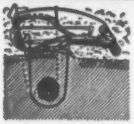

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The New Flower Arrangement For Everyone by Dorothy Biddle and Dorothea Blom. 185 pages, 80 photographs. M. Barrows & Co., Inc. $3.50.

Dorothy Biddle is somewhat of a legend among the garden clubs of these United States. Mrs. Biddle tours the country nine months of the year lecturing on the ideals of flower arranging. No garden club is too small or in too remote a place for her to visit and encourage. The opening sentence in this book is: "The whole wide world is a garden," and she is teaching homemakers how to enjoy its beauty. Dorothea Blom is also a creative writer and lecturer, but on a less extensive scale. The authors judge an arrangement according to its mood and its emotional quality. Horizontal lines are calm and restful; vertical lines on the other hand tend towards the austere, while curves are singing and joyous, etc. Included in the book is an interesting listing of garden flowers with a concise explanation for their use in floral arrangements.

---

share your experiences

Readers of *Organic Gardening* who had any experience with either of two recent developments in the organic method—the use of basalt rock in composting and the use of oak smoke as an effective and safe greenhouse fumigant—are urged to jot down their observations and send them in to this magazine. In so doing, you will be actively aiding the important investigation and research into the full evaluation and use of these methods.

Remember, the two developments are: basalt rock for composting (see *Organic Gardening*, November, 1952, p. 10)—and oak smoke for greenhouse insect control (December, 1952, p. 22). If *you* have had any experience with either or both of these, send them in—now. Address: *Organic Gardening*, Emmaus, Pa.

shoddy as a manure

The term *shoddy* may be unfamiliar to most *Organic Gardening* readers; and yet, it represents an organic fertilizing material of considerable value. This word is the English equivalent of what we in the U. S. call shear dust or the very short fiber residues of wool cuttings. English merchants define it as "wool waste, wool combings, or wool manure, to which no other matter has been added."

In the Autumn, 1952, issue of *The Farmer,* a British agricultural magazine of note, there appears an interesting item on shoddy. In part, this article states that:

"Shoddy is suitable for all root crops and for fruit to replace farmyard manure. It is nitrogenous material and is 100 per cent organic, humus-forming and water-holding. Even on heavy land it is useful to aerate the soil because of its spongy nature. Furthermore, it cannot be washed out by heavy rain. The material has a three-year value, it is claimed, because it takes that period for all its ammonia content (which provides its manurial properties) to be released.

"Usually between 35 and 40 cwts. per acre is recommended and to equal this in value nearly 40 times as much farmyard manure would be required."

Author Philip H. Barr states that shoddy should be bought perfectly dry, because once it gets wet it commences decomposition and ammonia is given off. Until then, the ammonia is fixed.

According to *The Fruit Grower,* from which the article was reprinted in *The Farmer,* wool shoddy will not burn and for this reason is valuable as an alternative to straw for mulching particularly where there is any fire risk. It can also be used in the fold to retain moisture.

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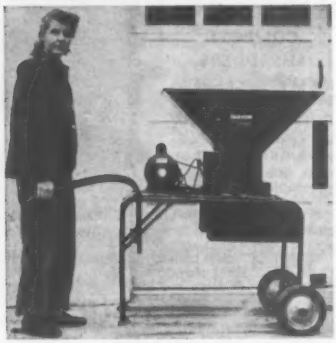

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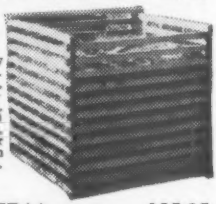

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QUESTIONS and ANSWERS

crops needing lime

Q. What crops need lime?

A. Legumes especially, the clovers, alfalfa, etc. They will often fail without it. All the grains should have it. Lime is not used on potatoes, but if the farm is rich in organic matter, our opinion is that less lime is needed. Some lime should be applied, except in land set aside for acid-loving crops, such as potatoes.

suburban composter

Q. Could I make a compost heap in a new galvanized garbage can? I have only a small backyard and not much room.

A. A garbage can could be made into an ideal composter. Punch holes in the bottom and in the sides as well as the lid. Place about 4 inches of fertile soil in the bottom of the can. Then layer your material in the same way as for a large heap in the garden. Such a composter is not objectionable even in the best residential parts of the city. If desired, plants can be grown and trained over the can so that it becomes converted into a mound of green leaves.

Any of the great number of organic materials which may be composted in larger heaps are available for use in this manner.

deficiency in tomatoes

Q. My tomato plants do not appear healthy. The plants are making poor growth and the tips of the leaves at the top of the plants are very yellowish in color. The stems are hard and are deep purple in color.

A. The symptoms you describe indicate nitrogen deficiency. I would suggest you apply organic matter which consists of leguminous material (clover, alfalfa, etc.). If the ground is not needed for planting this year perhaps you should grow a cover crop of legumes. After the crop is well established, apply a liberal covering of manure, finely ground raw limestone and finely pulverized phosphate rock. Work the cover crop and other materials added into the surface layer of soil. This practice will increase the nitrogen content, directly through the decomposition of the legume crop and indirectly through rapid increases in the biological activity of the soil organisms, resulting in greater nitrogen fixation from the air.

revitalizing neglected soil

Q. Can soil be so badly neglected that it is impossible to bring it back into production?

A. Practically all soils can be reclaimed and returned to productive condition. Consideration must be given, though, as to whether it is economically practical. For instance, on hillside land, erosion may be checked by terracing and planting the land in sod. However, if the slope is steep, it may be impractical to use it for anything but permanent pasture. If it is considered economically practical to bring a badly neglected soil back into fertile condition, then it should be planted with legume cover crops and, with the addition of rock fertilizers and compost, it would soon be revitalized.

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begonias

(*Continued from page* 19)

enough water in the pan to keep the soil moist at all times.

Some growers like to use a flat-sided, wide-mouthed bottle, partially filled with the soil mixture. Lay the bottle on the side and scatter the seeds with a long handled implement. Cover the bottle neck loosely, to admit some air. When the seedlings are ready to transplant, slip a wide-bladed knife under them and draw carefully out the wide bottle neck.

Seedlings sometimes show spotted leaves, which may be puzzling if they were not from spotted leaf varieties. As they get larger, the spots disappear, and the leaf takes on the appearance of the parent. The fresher the seed, the better the germination, although there are always some sterile seeds. Begonia seeds bruise easily and this destroys fertility. They should always be packed in cotton wool to prevent bruising. Usually seeds germinate in from nine to fifteen days, but some times weeks or even months will elapse before the seedlings appear. The *semperflorens* b e g o n i a s will bloom in six months from seed, the tuberous kinds in about the same time, but most of the fibrous kinds will not bloom until a year or more old.

Perhaps you would like to do some hybridizing of your own plants. For a seed parent, choose a plant which sets seed freely, such as *Begonia dregei*, or the unidentified plant which has been nicknamed Manda's Woolly Bear. Before starting your work, study color from the artist's standpoint, also the Mendellian laws of heredity. Then you will choose the parent plants more wisely than by the hit-or-miss method. The male begonia flower,

which supplies the pollen, has two broad petals and two narrow ones. The female flower has five petals, and the three sided ovary, or seed pod, forms on the back of the petals. Use a pocket microscope to examine the stigma in the center of the female flower. If it looks moist, pick a male flower with loose, dusty pollen, and brush it several times over the female stigma. A tag should be tied on the fertilized flower and the parentage recorded in a note book along with the date. Let the seed ripen and yellow on the plant if possible. Should the pod fall off before it is yellow, lay it in a dark, warm place to ripen. When it is quite dry, open the pod, shake out the dust-like seeds, and sow as soon as possible.

If your seedlings are *semperflorens,* the small plants will thrive in a south window. As they develop, discard the weaklings or any that show signs of disease or thrips. When the blossoms appear, discard those of unpleasing color or small flowers, keeping only the strongest plants of good color and free blooming habit. The plants may be fed at this time, using any good organic plant food. I find it easiest to mix old cow or sheep manure in the potting soil, using three parts sifted oak-leaf mold, two parts good compost, two parts old manure, two parts clean sand, a sprinkle of fine charcoal and another of bone meal. This mixture maintains healthy soil, helps produce strong, well-flowering plants.

Do not let young, growing plants become pot-bound, as this is a serious check to growth. If this should start to occur, replace in a size larger pot.

Liquid manure is excellent for feeding good sized plants. Soak the manure in water, then add a little clear water to make it the color of weak tea. Use this once a week, always on moist soil. It will never burn the roots, as chemical fertilizers so often do.

Should the seedlings be Rex be-

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gonias, the northeast window, which will give them only a little morning sun, is best. More sun will be tolerated if it is filtered by the leaves of other plants or by a muslin curtain. Remember that many florists grow beautiful, healthy Rex begonias under their benches where they get little or no sun. An experienced gardener who grows specimen Rexes in his home says, "Never let the sun touch Rex leaves." Strong light, but no sun, is his advice.

The fibrous rooted begonias are of so many varieties that one rule cannot be applied to all. The hairy kinds, such as B. Haageana, B. Mrs. Scripps and others, have thin, soft leaves that burn easily, so they should have only a little morning sun. The spotted-leaf kinds, like the Trout begonia (Argentea-Guttata), B. Maybelle E. and B. albo-picta, will do well without any sun. A strong north light will give dark green leaves with clear silver spots. As the foliage is the chief beauty of such begonias, the flowers are usually white or palest pink, and not of outstanding beauty. To find handsome foliage and handsome flowers on the same plant is the exception, not the rule.

Begonias noticeable for their bloom usually need a sunny window, not only to encourage flower production but also to give richly-colored blooms. B. *dichora*, for instance, a Brazilian species with flowers of flaming orange, loves heat and sun, and most of its seedlings, Di-Anna, Di-Erna, Orange Supreme, Orange Dainty and others, share this love of warmth. Most of the Rubra (Angel Wing) types need morning sun, until noon, at least, for their blooms. A pink-flowered begonia, lacking sun, will show flowers of palest pink or white, while the same plant, grown in a sunny window, will produce flowers of deep rose-pink.

acidity and alkalinity

An introduction to good gardening technique: plants have definite soil preferences which must be considered

Acidity and alkalinity of soils are the result of (1) the chemical nature of the rock from which the soil is derived, and (2) the partial or complete decomposition of vegetation. Alkalinity, so far as the growth of plants is concerned, is confined to the rather limited areas of limestone, the salt marshes, and the alkali deserts of the West.

The degree of preferred acidity or alkalinity of garden and field plants has long been established. But the bog, the wild-flower, and the rock gardener need a method of testing soils to determine with reasonable accuracy whether the sites are suitable for the plants involved.

The term pH means hydrogen-ion activity. This activity is of such great importance in the vital processes of soil organisms and of higher plants that every gardener and farmer should have a clear understanding of pH.

Chemists have devised a scale for measuring the acidity and alkalinity of soils based upon their hydrogen-ion concentration or pH value as it is called. It is based upon the known color reaction of certain pH values for certain chemical indicators.

For practical purposes we may classify soils as follows: pH 4.0 very acid; pH 5.0 acid; pH 6.0 slightly acid; pH 7.0 neutral, i.e., neither acid nor alkaline; pH 8.0 alkaline; and pH 9.0 as strongly alkaline.

Very Acid Soils (pH 4.0) occur in peat bogs covered with sphagnum

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moss and in the duff under coniferous trees.

Acid Soils (pH 5.0) include peaty upland soils, rotted wood, some pine-barren sands, and heavily fertilized but seldom limed fields and gardens. Some plant indicators of acid (pH 5.0) soil are dwarf cornel or bunchberry, golden thread, arbutus, mountain laurel, trillium, and mountain ash.

Slightly Acid Soils (pH 6.0) occur in most gardens in non-limestone regions, and in gardens in which manure or other organic matter is never used and which are seldom limed. Garden plants which prefer this type of soil are potato, watermelon, tobacco, and spinach.

Neutral Soil (pH 7.0) occur in ordinary gardens in which are used manures, organic matter of other types, and lime. Also most composts, rotted manures, and black leaf molds are neutral. In this soil most of our garden plants thrive.

Alkaline Soils (pH 8.0) occur in salt marshes, limestone soils, and heavily limed soils. Plant indicators of alkaline soils are rough bedstraw, oxeye daisy, and Trifolium medium.

compost and the pH of the soil

Humus functions as a buffer in the soil. Garden and crop plants are far less dependent upon a specific pH in the soil when there is an abundant supply of humus. For instance, potatoes require a distinctly acid soil when the humus content is low. In less acid or neutral soils low in humus, potatoes are highly susceptible to potato scab. In practical potato growing it often is desirable to follow potatoes by crops which will not tolerate soils that are too acid, as cabbage, cauliflower, and Brussels sprouts.

answers to review questions

(See page 26 Course in Organics)

1. True. If there were no decomposition, these substances would be of little value in the soil. As decay takes place, nitrogen and other substances are released when there is sufficient organic matter for a continuous process of decomposition to go on.
2. False. It has been found that when fresh organic matter was added to a soil, there was an acceleration in the decomposition rate of the existing soil organic matter, probably because of the resultant stimulation of soil bacteria.
3. True. Aeration is one of these conditions that make it ideal for microorganisms to do their share in the process of decomposition. The others are temperature, moisture and acidity.
4. True. It saturates the soil water, forming an acid solution which has a solvent action on the minerals in the soil, making them available for plant use.
5. False. If there is little addition of organic matter from year to year in a soil, after a while it will contain humus that is old and lacking in the required dynamic quality. The soil under some conditions becomes more or less permanently covered with water and asphyxiation occurs. The decomposition process stops altogether and eventually peat or coal is produced.

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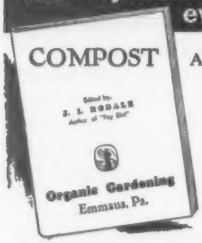

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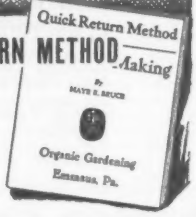

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mixtures for planting plants and bulbs

Reprinted from *Nature Outlook*

EARL T. HARPER

When transferred from one pot to another of larger size without root disturbance are as follows:

general purpose mixture:

Chrysanthemums, Fuchsias, Geraniums, Palms, Screw Pines and similar plants: Four parts loam, 2 parts sand, 1½ parts dried cow manure, 2 parts leafmold with ½-cup bone meal to each peck of mixture. If loam is clayey, increase quantity of sand; if sandy, reduce it. Loam—taken from a sod pile which is reasonably free from stones, does not need sifting. Chop up the lumps with a spade into pieces of walnut size. If put through a screen, much of the desirable fibrous material will be held back by the sieve. The leafmold should be passed through a ½-inch sieve for small pots; a 1-inch sieve for pots 6 inches and over. This is to remove sticks and stones. The manure should be rubbed through a ¼-inch mesh sieve.

for bulbs:

Daffodils, Hyacinths, Tulips: Six parts loam, 4 parts sand, 3 parts leafmold with ½ cup bone meal to each peck. For Amaryllis, Lachenalia, Veltheimia, and the like, add 1 part thoroughly rotted manure to the mixture.

for plants requiring a humusy mixture:

African-violets, Begonias, Ferns, et cetera: Four parts loam, 4 parts leafmold, 2 parts sand, 2 parts dried manure; with ½ cup bone meal and 2 cups broken charcoal (¼-inch and smaller) to each peck of mixture. The last item is not essential, but does help make the mixture light and well aerated, which is desirable.

for acid-soil plants:

Azaleas, Camellias, Gardenias, et cetera: Four parts loam, 3 parts sand, 3 parts peatmoss, 1 part leafmold, 1 part thoroughly rotted manure.

for cacti and succulents:

Equal parts loam, sand, leafmold, mortar rubble (or broken bricks, or flower pot chips) with ½ cupful of bone meal to each peck. One successful grower of Cacti uses double the amount of leafmold.

for christmas cactus, orchid cactus:

Four parts loam, 2 parts sand, 3 parts peatmoss, 1 part leafmold, 1 part thoroughly rotted manure, 1 part mortar rubble, 1 part broken charcoal.

---

some vegetable pointers . . .

The success achieved in the actual growing of vegetables depends, of course, to a great degree on their proper organic fertilization. One pound each of potash and phosphate rock per ten square feet. Lettuce has a scanty root-system and requires a soil rich in humus which, in addition to providing nitrogen, increases the water-retentive properties of the soil. Corn does particularly well when thoroughly decomposed compost is used. It prefers a soil of slightly acid reaction, *i.e.*, pH 5.6 to 6.8. Cucumbers do best when well-rotted manure has been incorporated directly where the seed is planted. Beans need a well-prepared, thoroughly-drained soil. This vegetable, as well as peas, prefers not to have too much nitrogen. Peas thrive in a well-limed soil, with low nitrogen content. Tomatoes do best in a soil having good moisture retention properties and thrive under a wide pH range.

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LANDSCAPE WITH SHRUBS AND FLOWERING TREES by Mary Deputy Lamson. M. Barrows & Co. 295 pages. Illustrated, indexed. $3.50.

THE TREES OF LONG ISLAND by George H. Peters. The Long Island Horticultural Society Publication No. 1. 63 pages. Illustrated. $1.00 (Paper bound).

TREES FOR AMERICAN GARDENS by Donald Wyman. The Macmillan Co. 376 pages. Illustrated, indexed. $7.50.

ILLUSTRATED GUIDE TO TREES AND SHRUBS by Arthur Harmount Graves, Ph.D., Curator Emeritus, Brooklyn Botanic Gardens. 240 pages. Illustrated, indexed. Published by author at Wallingford, Conn. $4.00.

SYSTEMICS OF FLOWERING PLANTS, AN INTRODUCTION by Patricia Mann. Pitman Publishing Corp. 307 pages. Illustrated, indexed. $4.50.

COLOR IN THE GARDEN by Norman Taylor. D. Van Nostrand Company, Inc. 118 pages. Indexed. $2.00.

THE PERMANENT GARDEN by Norman Taylor. D. Van Nostrand Company, Inc. 128 pages. Indexed. $2.00.

ANNUALS FOR EVERY GARDEN by Dorothy H. Jenkins. M. Barrows and Company, Inc. 223 pages. Illustrated, indexed. $3.00.

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(*Continued on page 76*)

violets from Africa

Among the most popular of house plants, African violets offer a constant, colorful reward

ESTHER T. LATTING, N. H.

The Saint Paula or African Violet comes from a section of Africa where limestone cliffs are common. The plants grow at the base of these cliffs in woodland, generally close to streams. This gives us a clue to the conditions necessary for healthy plants. The soil should be woodsy and slightly alkaline. A little bone meal mixed with the dirt will help to keep it alkaline and at the same time provide phosphorus for better blooming. Rich garden soil mixed with peat moss until it is soft and absorbent is fine. Woods dirt is excellent. A little compost and rotted manure will supply food and some sharp sand, good drainage. For a starter, one third each of peat moss and rich garden soil, and one sixth each of rotted manure and sand with a teaspoonful of bone meal to each seven inch pot makes a good safe potting mixture.

Leaves are the least expensive method of starting. Friends are always glad to give one a start. As your collection grows, you may swap with other enthusiasts or buy leaves of new varieties. The leaves may be started in water, sand, vermiculite or plain dirt. I like to put a quarter inch of plain dirt in the bottom of a glass jar and one inch of coarse sand or vermiculite on top of this. The dirt serves as a nourishment for the plant as soon as it forms roots. Moisten the rooting medium and let it stand a day with the cover off the jar.

The base of the leaf should be near the soil but the shorter the stem, the quicker the little plant will show above ground. After the leaves are in the sand, put a tight cover on the jar. This will keep it moist enough so that watering will probably not be necessary. The jar should be kept in a warm light place but not in direct sun. If the contents are too wet, the sides will steam up and the cover should be removed for an hour or two once a day until this condition is corrected.

When the little plants are about an inch high, they may be potted up. At this time the parent leaf may be broken off and put back in the propagating jar. If you have a large glass jar in which you can put the newly potted plant for a few days, it will adjust better to the change from sand to dirt.

The little plants may be started directly in three inch pots. Great care is necessary in watering, however, to prevent the soil becoming waterlogged.

Too much moisture is one of the causes of crown rot.

African Violets are one of the few plants that will bloom and flourish in a north window. They do best in a temperature around 70.

Firm in her belief that anything coming from the soil should be returned to it, Mrs. Leversee dumps the collected dirt on her back lot.

A petite old lady . . .
with a most unorthodox source
of soil fertility . . .
has an astonishing garden

from gutter to garden

DAN RYAN, MICH.

A white-haired little woman with a country girl's love of the good earth and the things it can yield is amazing her neighbors by harvesting a year's supply of vegetables from the dust of a city's streets.

She is Mrs. H. R. Leversee of Kalamazoo, Michigan, and for nearly 20 years she has turned a shovel, a wheelbarrow and the courage of her convictions into as beautiful and productive a back-yard garden as there is in the city.

Mrs. Leversee's source of dirt for her garden is unorthodox to say the least. Every morning for the past 17 years, with the exception of the bitter cold days of winter, this amazing little woman has trundled her wheelbarrow into the streets of her neighborhood and shoveled up the dirt which always lines the gutters.

She fills up her wheelbarrow and rolls it back to her home where she spreads it over her back yard or lawn or wherever she needs it most. If it's a good day and she feels spry enough, she will make two or three trips up and down the streets in search of dirt. And sometimes she's even out in the evening.

She's never kept a record of her work, never thought it would interest anybody. But it's a safe bet that Mrs. Leversee, at an age when most women have slowed down to knitting a fast pair of mittens for a grandchild, has hauled at least 100 tons of dirt from gutter to garden in the last 17 years. It amuses her that anyone should care about her project.

"I know that a lot of my neighbors and others who see me out with my shovel and wheelbarrow think I'm crazy," she says with a smile.

"But I've reached the age where I don't care what others think. If I ever do have any doubts, all I have to do is look at my beautiful garden, my flowers, my cellar full of canned vegetables, and I know I'm right.

"You see, I was born in Arkansas. Down there everyone knows the value of earth. If you are lucky enough to own any, you guard it. My father never let a day pass that he didn't tell us that the earth took care of us and we had to take care of the earth.

Photos: The Kalamazoo Gazette

Mrs. Leversee amid the multitude of vegetables and flowers she grows with the aid of fertility-laden dirt collected daily from the gutters of her neighborhood.

"Up here it's different. Folks take their earth for granted. They buy expensive topsoil, it rains, the topsoil drains off into the gutters and they start over again buying more soil.

"If you just stop to think about it, any dirt in the city streets must be top dirt. It may look like dust and be full of grit and cinders, but it's rich and strong. It's a crime to let it flow into the sewers and be lost."

Mrs. Leversee, who attended college in Arkadelphia, Ark., and then taught school for years, came to Kalamazoo in 1926. In that time, using her unusual soil-salvaging system, she has raised the level of her lawn at least six inches above her neighbors' and turned her barren back yard into a living supermarket.

"I've worn out three wheelbarrows in the process," says Mrs. Leversee, who has been a widow since 1947. "But look what I have."

"I got over 23 dozen ears from four 30 foot rows of corn this year," she states proudly. "I'll bet a lot of the people who stopped to buy a few ears from me are the same who let their own top dirt run off into the gutters.

The tireless little widow, who can't weigh much more than a bushel of potatoes, cans a good share of her vegetables and then saves the balance of the gutter-born crop in a freezing unit which is as old as time.

"Each fall I dig a shallow hole in the garden. Then I put all extra vegetables in the hole in separate piles. The hole is lined with leaves and the vegetables are covered with leaves. Then I cover it all up with dirt.

"As the winter passes by I can go out to my natural 'deep freeze' and dig up fresh vegetables any time I want them."

This amazing little woman, a combination of pioneer, soil conservation expert, farmer and manual laborer, scoffs at the work involved in her dirt collecting and gardening.

"Working is like walking," she says. "If you enjoy it you never notice it. I like to work with just plain dirt. I like to see things grow in it. Every shovelful I take from along the curbs will produce food someday. I'll never get tired of watching that happen."

Bark and leaves of Arizona Sycamore.

landscaping for everyone

Part III

Texture Character

Completing a serviceable trio of articles on the fundamentals of securing proper landscape design

MYRON PARISH, MICH.

Photos: Courtesy U. S. Forest Service

Texture has been, and is, one of the most discussed and misunderstood words in the landscaper's vocabulary. It is one of the three basic factors which we must consider in the composition of a beautiful landscape. Basically, texture includes the appearance of trees, shrubs and flowers as they will look in their permanent places in the completed landscape. Some trees, shrubs and flowers have a smooth appearance, while that of others is rough. These smooth and rough appearances are the direct result of the various sizes and shapes of the plants. The variations of size, appearance and shape among the parts of the plants produce texture. In our minds, we are aware of these various textures only by seeing them, and if we are to produce a unified composition, we must use these variations of plant textures and arrange them into a gradual change from tall, coarse-textured plants to low, fine-textured plants. It is customary with most landscapers, because of scale relations between the shape, size and texture of plants, to use the tall, coarse-textured plants for backgrounds, accent points, and distant planting effects; and, to use the low, fine-textured plants for close-up plantings.

Texture can mean more than just smooth and rough appearances. To the gardener just beginning, these two basic factors are a must in starting the landscape picture. By using these two and adding a lot of experience with the various plants, he will gradually become acquainted with other factors, such as: fineness and coarseness, lightness and heaviness, denseness and thinness, flexibility and stiffness.

We shall have to take into consideration the seasonal variations of the plants. Take, for instance, the dogwoods. In the spring their red, yellow and gray bark, makes a beautiful background, and as the summer brings on the green foliage there is still a hint of these shades of bark showing through the green leaves, providing another type of texture. Dogwoods are just one of many such examples of seasonal texture variations.

The location, soil, and moisture content of a soil are three factors

Top: American Beach.
Lower: White Oak.

Top: Yellow Birch.
Lower: Sugar Maple.

which do a lot in regulating the quality of the texture in plants.

Plants constantly change their characteristics with age. For instance, when young, the bark will be of a soft texture increasing to a more coarse texture as they become more mature.

Paths are another small but important texture factor in composing a good design. These little paths which wind in and out among the trees and shrubs should harmonize in their texture with that of the surrounding landscape. With the exception of large landscaped estates, it is my contention that it is a very bad example to use cement walks. If cement walks have to be used, soften their glaring effects by coloring them a soft green, red or blue. This can easily be done by using concrete color dye.

It is well to remember to avoid too great a contrast as well as too great a variety of textures, for too sudden and too strong a contrast will bring a discordant result. Let us take for an example a beautiful lawn of creeping bent or Kentucky blue grass. A lawn of this type by itself has unity and produces a beautiful picture. Now, if we were to allow dandelions to infiltrate into the lawn, we would have too great a contrast, and a resulting discord. We would also lose the fine soft-textured effect produced by the grass alone.

One thing we must remember when we use the various textures in our landscape design is that the resultant effect must be simple; it must have scale relationship, sequence and balance. If we keep these in mind we shall produce a garden composition that will be pleasing and acceptable, not only to ourselves, but also to all who view it. Texture applied by following these simple rules will stimulate the imagination and create an effect of character. It will give a symbolization of power, strength, refinement and good taste to our composition.

MISCELLANY

J. I. RODALE

insect olympics

The following is a short excerpt from the March, 1952, issue of *Prevention*, written by myself:

I was reading the other day that the average of last year's crop in the United States had the lowest protein content in history. Now there is a peculiar thing about the nutritional habits of insects. Where man thrives best on a high protein diet, insects go for carbohydrate. They need it more in their system of operation. An insect can jump the equivalent of the Empire State Building in one jump, comparatively speaking to its size, of course, and it needs a lot of carbohydrate for that energy. Man does not have to jump that high in one jump. So when a plant has more carbohydrate than another, an insect will seek it out and prefer it. It can sense it in some way, perhaps like we smell the aroma of coffee.

food protein decreasing in crops

Beginning with the active use of chemical fertilizers, the protein content of crops began to go down. In a recent ten year period, in the Middle West, the protein content of the grains declined 10 per cent, or an average of one per cent per year. At that rate, in about 70 or 80 years the crops will be down to zero as far as protein is concerned and people will be eating so much carbohydrate that, after a few generations, they will suddenly begin jumping over sky-scrapers. But they will be completely bereft of reason, for you need protein to feed and rebuild brain tissue. It might be an interesting world, with everyone jumping over buildings, but I'm wondering what would happen to planes piloted by such carbohydrate-fed men, to trains driven by such Grade C intellects and to our whole complex machine civilization. Will it suddenly collapse like the Tower of Babel? Are we gradually producing our own destruction within ourselves, without benefit of atom-bombs?

Of course, it will not all happen as simply as all that. First, there will be war! The scientists, seeing the protein content going down, will breed highly artificial varieties of seed that will grow plants higher in protein. But this will be only a temporary stop-gap. They are actually doing that very thing right now. But experiments with mice show that those fed on food raised from plants that have not been tampered with as far as protein is concerned, are healthier. Trying to increase the protein content on a permanent basis, without doing it naturally, is like the attempt of Canute, the old Danish King of England, Denmark and Norway, to hold back the wild ocean waters. It will never be accomplished.

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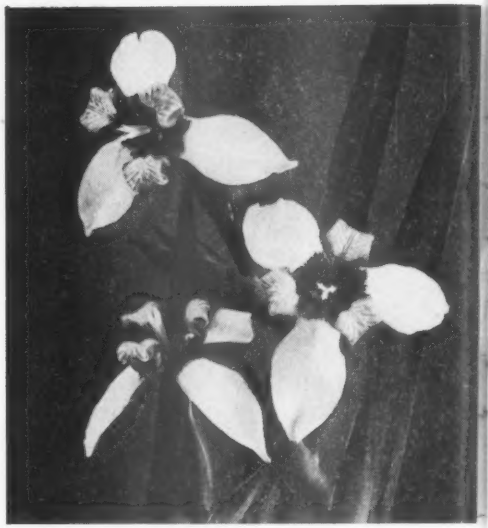

Bloom of the graceful Marica gracilis.
Photo: J. Horace McFarland Co.

My office phone rang. I picked up the receiver.

"United Millinery Company," I said in a business-like manner.

"It's blooming!" came the excited voice of my husband from the other end of the wire.

"Get the camera!" I flashed back. "Take a few pictures with the flash, and some without! I'll try to get away early . . . oh dear, I do hope it will be blooming when I get home."

Yes, this was the day we had awaited so eagerly. How fortunate, I thought, that my husband was not working today. Last year we had missed seeing our Marica reach full maturity. A member of the Iris family, this plant, with its exquisite iris-like flowers, blooms only once a year, and then, only for a day.

The Marica, also called the Apostle Plant, or Twelve Apostles—so-called because the individual fans commonly contain twelve leaves—is a very decorative plant. Most descriptive is the term "House Iris," since the leaves grow in an Iris-like fan—the tallest of the sword-shaped, light green leaves reaching as high as two feet. Most interesting is the manner in which the flowers—which are of orchid form and color—develop near the sides of the leaflike stems.

The species most commonly known is the *Marica northiana,* whose flowers are three to four inches across—the colors, blue, lavender, and pure white, with the inner segments marked with violet.

The other species—*Marica gracilus* —is smaller in all its parts. Its white flowers are marked with yellow, brown and blue. Ours is of this species, the flowers being marked with yellow and brown.

Blooms may be expected after the turn of the year—sometimes late winter, or early spring. Be careful not to cut off fresh blooms on the next day when they fade, as plantlets sometimes develop on the flowering stems. Progenies are ordinarily allowed to develop in place until May, at which time the young plants are cut off and separately potted. Some of these would make delightful gifts for your friends, since very few common growers offer this plant for sale.

Maricas have no roots at first, but ordinarily they form a fine cluster of their own. While the large tops suggest that the roots require a large container, actually they take up so little space that a pot just big enough

DON'T FEEL OLD Before Your Time!

WHY are some people past middle age erect and hearty while others are stooped and "old looking"?

RESEARCH has shown that good diet with adequate vitamins and minerals can help keep you well. For example, shrinkage of height and fragility of bones *is not necessarily due to advancing years.* It can be due to a calcium deficiency in your diet. The lack of Vitamin C and iron may cause that tired "washed-out" feeling.

An Ounce of Prevention

Night vision, arterial and gland functions can be influenced by an adequacy of certain vitamins. Clinical tests show the new vitamin B-12 can contribute to the sense of well-being of those in the middle years. Iron, which is often one of the most deficient elements in the daily food intake, is important to carry life-giving oxygen to tissues and to carry away waste. While there are many reasons for illnesses that only your doctor can determine, even a mild shortage of vitamins and minerals in the diet *can be a main cause and do permanent damage.* "An ounce of prevention is worth a pound of cure."

Well Fed But Undernourished

THE COMPLEXITIES of modern civilization often deprive us of the full vitamin value of our foods. This is due to the time lag between farm and table, over-processing of foods, unbalanced meals and mineral-depleted soil. *Supplementing your meals with Schiff V-COMPLETTE may do wonders for you.* V-COMPLETTE is made with 100% NATURAL vitamins and minerals plus blood-building organic iron. This is important! Only *Natural* vitamins carry unisolated "trace elements" never present in the conventional *synthetic* vitamin mixtures.

10 Wonder Foods in an ALL-IN-ONE Formula

V-COMPLETTE contains NATURAL A & D vitamins; full NATURAL B COMPLEX, including B-1, B-2, B-12 and many others; IODINE from sea kelp to prevent goiter and common iodine deficiency; sterilized BONE MEAL containing Red Bone Marrow and NATURAL minerals, including calcium, phosphorus, iron, manganese, silicon, fluorine, cobalt, and other trace elements; WHEAT GERM OIL; DESICCATED LIVER and a superior NATURAL C Complex from Rose Hips.

SCHIFF V-COMPLETTE NATURAL VITAMINS & ORGANIC MINERALS

Try V-COMPLETTE tablets for just a few weeks and see how wonderful you feel. Recommended by many doctors. Money-back guarantee of satisfaction.

60 tablets, $2.50; 100, $3.90; 300, $9.90; 1000, $25.00

At Good Health Food Stores
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SOIL AND HEALTH FOUNDATION

Emmaus, Pennsylvania • J. I. Rodale, President

for these is proper, rather than one proportioned to the fanned-out top.

It is possible that the plants may be ready with late winter bloom, but generally this does not occur until the second year.

Needing nothing more than routine care and general purpose mixture for potting, being pest and disease free, tolerant of extreme heat and cold, and only moderately demanding about sun, the Marica is indeed a matchless house plant. All species thrive without sunlight, but for the most profuse results place the plant in a sunny window. Be generous with water. I water mine every day. Re-potting to larger quarters is an essential May chore for all year-old stock. Older plants are frequently divided, or more wisely discarded in favor of a younger generation.

For generations this treasure has been passed from neighbor to neighbor, so the young plants you give your friends will become especially treasured gifts.

new books

(Continued from page 66)

AMERICAN TREES, A BOOK OF DISCOVERY by Rutherford Platt. Dodd, Mead, and Co. 256 pages. Illustrated, indexed. $3.50.

THE AZALEA HANDBOOK by Frederic P. Lee, Fred O. Coe, B. Y. Morrison, Milo Perkins, and Freeman Weiss. The American Horticultural Society. 148 pages, illustrated. $2.60.

MANGO STUDIES. Compilation published by Florida Mango Farm. 156 pages. Illustrated, indexed. $4.00.

GLOXINIAS AND HOW TO GROW THEM by Peggie Schulz. M. Barrows and Company, Inc. 128 pages. Illustrated, indexed. $2.95.

THE NATURE AND PROPERTIES OF SOILS by T. Lyttleton Lyon, Harry O. Buckman, and Nyle C. Brady. Fifth edition. The Macmillan Co. 591 pages. Illustrated, indexed. $5.75.

SOILS AND SOIL FERTILITY. McGraw-Hill Book Co., Inc. 339 pages. Illustrated, indexed. $5.00.

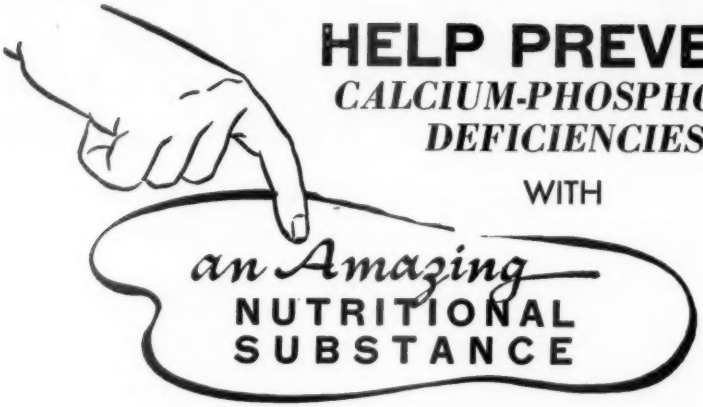
compost . . . the gardener's best friend

Here is the way you can have an endless supply always ready whenever needed: Provide a clean space at least 5 ft. by 5 ft. Start the heap with 6 inches of green matter (any green waste materials). Next, add a 2-inch layer of manure, then 1/8-inch of earth covered with a sprinkling of agricultural lime. Repeat these layers successively until a total height of 5 ft. is reached, including a 2-inch layer of earth over the completed heap.

Turn the heap thoroughly three weeks after its completion, then again five weeks after the first turn. Four weeks later, or three months after the heap was made, it is ready for use.

These directions are necessarily brief, and it is suggested that the gardener wishing a more complete guide write for J. I. Rodale's thorough booklet, *Compost and How to Make it;* 35c, *Organic Gardening,* Emmaus, Pa.

Watch Your Diet for MINERALS!



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(Natural . . . Nothing Added)

Take your choice of these three popular forms of diet supplements.

TABLETS . . . Each contains 7½ grains of plain Bone Meal.
100—75c; 500—$2.50; 1000—$4.00

CAPSULES . . . Also contain 7½ grains of Plain Bone Meal.
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POWDER (Bulk) . . . Use in Muffins, Bread, Soups, Cereals.
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BONE MEAL with VITAMINS A and D

Vitamin D is needed to regulate Calcium and Phosphorus metabolism and their utilization by your body. Vitamin A is needed to keep up normal resistance to infection.

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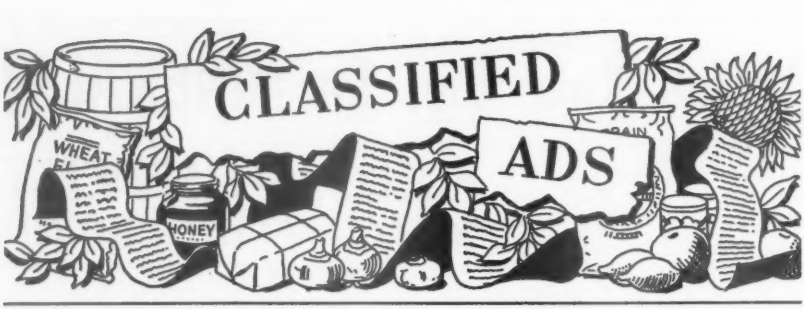

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OUTDOOR TOILETS, CESSPOOLS, SEPTIC TANKS cleaned, deodorized with amazing powder. Safe easy, economical. Saves digging, pumping. Details FREE. **BURSON LABORATORIES, Dept. O-83, Chicago 22, Ill.**

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FRESH RAW, SALT-FREE ALMOND BUTTER. You'll love it! Two 8-oz. jars $1.95. Pecans: New crop tasty organically grown. 5 pounds $3.50. Honey sweetened apricot marmalade. No sugar or preservatives. Six 15-oz. jars $4.50. Big, luscious dates. 5 pounds $3.25. We pay postage. Free folder many delicious foods. **TONTZ HONEY FARM, Elsinore 9, Calif.**

THE BEST BREAKFAST CEREAL IN AMERICA. VITA CEREAL made from Toasted Almond flakes, Cocoanut, Wheat Germ, Wheat Flakes. Energy and Vitality food. Vitamin Candy. No sugar. Contains Dates, Walnuts, Wheat Germ, Honey. Send $2.00 we ship 1 Box Candy mixed. Weeks supply Vita Cereal for 2 prepaid. Stone ground flour and cereals. Healthfoods. **THE MILL, Box 699, Ledi, Calif.** Ask for folder.

ORGANICALLY GROWN WHEAT processed into 100% whole wheat and cereal containing all the original vitamins and mineral salts of the wheat berry. Trial 5 lb. bag of flour or cereal sent postpaid for $1.15; west of Mississippi River $1.40. **LOUHELEN RANCH, Davison, Mich.**

GOLDEN NECTAR VALENCIA ORANGES. California's finest premium quality, direct from grower. No poisons-chemicals; nutritionally safe! Write for descriptive bulletin. **KOENTOPP RANCH, 1010 N. Broadway, Santa Ana, Calif.**

OLD FASHIONED SEEDLESS RAISINS! Organically grown without poisons, commercials. Sweet—70% unrefined grape sugar. Sun-dried. Ship wts. **POSTPAID PRICES:** 11 lbs. $4.55, 4 lbs. $1.85. **GILBERT'S ORGANIC FARM, Rt. 2A, Suitana, Calif.**

DATES AND PECANS—Combat Summer Fatigue—Safe Foods—Organically Grown by us in deep Virgin Soil. Free from poisonous sprays and artificial preservatives. Rich in many required minerals and vitamins. 2 lbs. Desert Nuggets, $1.00; 5 lbs. Family Special, $2.50; 5 lbs Choice Dates, $3.25; 5 lbs. Pecans $4.50; 15 lbs. Chewy Natural Dates, $6.75; 2 qts. Creamed Dates, $3.00, delivered in U. S. **LEE ANDERSON'S COVALDA DATE COMPANY (Grower, Packer, Shipper), Coachella, Calif. P.O. Box 208-O.**

STONE GROUND WHOLE WHEAT FLOUR, 5 lbs. 75¢. Organically Grown. Unbleached White Flour, 10 lbs. $1.25. Postage extra. **THE RADIKE ORGANIC FARMS AND MILLING CO., Marine City, Michigan.**

BEST BAKED GOODS YOU'VE EVER TASTED. Made from 100% STONE GROUND ORGANICALLY GROWN WHOLE GRAINS, honey, fresh milk, raw sugar, butter, eggs, yeast, NO preservatives or bleaches. Breads, cookies, etc. Also huge selection of all natural foods. We ship regularly to customers throughout U. S. Guaranteed fresh delivery. Send 50¢ coin for delicious loaf bread and catalog postpaid. **STONE MILL PRODUCTS, Dept. BB-6, 1014 Franklin St., Grand Rapids, Michigan.**

ADIRONDACK HONEY. Same famous Mountain Honey as featured in the March issue. At $2.00, per five pound tin delivered. **MAURICE N. SHUTTS, Merrill, New York.**

SUNFLOWER SEEDS—Hulled or Unhulled. Small supply from Rodale Organic Farm. Unhulled seeds 70¢ lb. postpaid (90¢ lb. W. of Miss.). Freshly hulled seeds $1.50 lb. postpaid ($1.70 W. of Miss.). Write for prices on large quantities. **RAYMOND GREENBAUM, R.D. 2, Allentown, Penna.**

O. G. hulled Sunflower seeds. 2 lbs. $2.50, 5 lbs. $5.25, 10 lbs. $10.00 prepaid in U. S. Stoneground Whole Yellow Cornmeal 5 lb. $1.10, 10 lb. $2.00 prepaid in 4th zone or up to 600 miles. **NATUR-GANIC FARM, R. 5, Alliance, Ohio.**

ORGANIC FOODS FOR SALE: Sold at farm only. **Top Farm 5½ miles north of Woodstock, Illinois on Route 47.** Turn at sign in tree. 1½ miles east to farm. Phone Hebron 2812.

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GREEN FOAM

A Natural Oil Shampoo for that Soft, Silky Natural Hair Beauty

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Now . . . at last . . . here is a soft, gentle yet truly effective shampoo made entirely from natural oils. GREEN FOAM Shampoo is entirely free from harsh alkali soaps and irritating detergents (known now to cause dryness). GREEN FOAM Shampoo was developed by FalMay in response to demand for a natural hair cleanser.

This foaming green scalp and hair cleanser is highly concentrated. Apply only a few drops. Your hair billows out in a foaming lather. Dirt, dandruff and other hair accumulations are surrounded, picked up and ridden away on a wave of suds. Leaves your hair soft and lovely, your scalp pink and clean. Order GREEN FOAM Shampoo today for soft, clean, lovelier hair!

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MASTER-FORM HAIR CREME not only tends for healthier hair, but has proven ideal as a hair groom. Helps rid the scalp of unsightly dandruff, scalp irritation. Also brings out all the natural highlights in your hair (gray hair becomes silvery gray—brunette becomes rich natural brown—black becomes blue black—red becomes golden red). Your hair color is unchanged . . . but all the natural highlights are accentuated. Ideal for men, women, children. Three convenient sizes:

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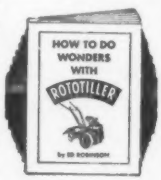

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